

EP1.1U

AA

Service Service Service

For manual LGE PDP panel see: 3122 785 15590

For manual FHP PDP panel see: 3122 785 14580

For manual SDI PDP panel see: 3122 785 14990



Service Manual

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1. Technical Specifications, Connections, and Chassis Overview

Index of this chapter:

- 1.1 Technical Specifications
- 1.2 Connection Overview
- 1.3 Chassis Overview

Notes:

- Some models in this chassis range have a different mechanical construction. The information given here is therefore model specific.
- Data below can deviate slightly from the actual situation, due to the different set executions.
- Specifications are indicative (subject to change).

1.1 Technical Specifications

1.1.1 Vision

Display type	: Plasma (SDI)
Screen size	: 42" (107 cm), 16:9
	: 50" (127 cm), 16:9
Resolution (HxV pixels)	: 1024(*3)x768p (42")
	: 1366(*3)x768p (50")
Min. contrast ratio	: 10000:1
Min. light output (cd/m ²)	: 1200 (42")
	: 1300 (52")
Viewing angle (HxV degrees)	: 160x160
Tuning system	: PLL
TV Color systems	: ATSC
	: NTSC
Video playback	: NTSC
Cable	: Unscrambled digital cable - QAM
Tuner bands	: VHF, UHF, S, Hyper
Supported video formats	: 640x480i - 1fH
	: 640x480p - 2fH
	: 1280x720p - 3fH
	: 1920x1080i - 2fH
Supported computer formats	: 640x480 @ 60Hz
	: 800x600 @ 60Hz
	: 1024x768 @ 60Hz
	: 1366x768 @ 60Hz

1.1.2 Sound

Sound systems	: AV Stereo
	: BTSC
	: Dolby Digital (AC3)
Maximum power (W _{RMS})	: 2 x 15 W

1.1.3 Multimedia

Supported file formats	: JPEG
	: MP3
	: Slideshow (.alb)
USB input	: USB1.1

1.1.4 Miscellaneous

Power supply:	
- Mains voltage (V _{AC})	: 110 - 240
- Mains frequency (Hz)	: 50/60
Ambient conditions:	
- Temperature range (°C)	: +5 to +40
- Maximum humidity	: 90% R.H.

Power consumption (values are indicative)	
- Normal operation (W)	: ≈ 400 (42")
	: ≈ 480 (50")
- Standby (W)	: < 1
Dimensions (WxHxD in inch)	: 49.2x27.1x4.4 (42")
	: 56.1x30.9x4.4 (50")
Weight, stand included (kg/lbs)	: 40/87.6 (42")
	: 57/125.6 (50")

1.2 Connection Overview

Note: The following connector color abbreviations are used (acc. to DIN/IEC 757): Bk= Black, Bu= Blue, Gn= Green, Gy= Grey, Rd= Red, Wh= White, and Ye= Yellow.

1.2.1 Side Connections



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Figure 1-1 Side I/O connections

S-Video (Hosiden): Video Y/C - In

1	- Ground Y	Gnd	⏏
2	- Ground C	Gnd	⏏
3	- Video Y	1 V _{PP} / 75 ohm	⏏
4	- Video C	0.3 V _{PP} / 75 ohm	⏏

Cinch: Video CVBS - In, Audio - In

Ye	- Video CVBS	1 V _{PP} / 75 ohm	⏏
Wh	- Audio L	0.5 V _{RMS} / 10 kohm	⏏
Rd	- Audio R	0.5 V _{RMS} / 10 kohm	⏏

Mini Jack: Audio Headphone - Out

Bk - Headphone 32 - 600 ohm / 10 mW



USB1.1

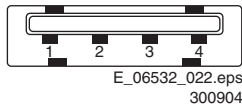
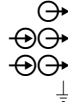


Figure 1-2 USB (type A)

- 1 - +5V
- 2 - Data (-)
- 3 - Data (+)
- 4 - Ground



Rd - Video Pr

0.7 V_{PP} / 75 ohm

Wh - Audio L

0.5 V_{RMS} / 10 kohm

Rd - Audio R

0.5 V_{RMS} / 10 kohm



AV1 Cinch: Video YPbPr - In, Audio - In

Gn - Video Y

1 V_{PP} / 75 ohm

Bu - Video Pb

0.7 V_{PP} / 75 ohm

Rd - Video Pr

0.7 V_{PP} / 75 ohm

Wh - Audio L

0.5 V_{RMS} / 10 kohm

Rd - Audio R

0.5 V_{RMS} / 10 kohm



HDMI 1 & 2: Digital Video, Digital Audio - In



Figure 1-4 HDMI (type A) connector

1.2.2 Rear Connections (under side)

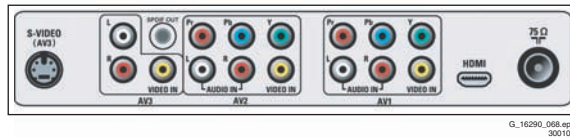


Figure 1-3 Rear connections (under side)

AV3 S-Video (Hosiden): Video Y/C - In

- 1 - Ground Y Gnd
- 2 - Ground C Gnd
- 3 - Video Y 1 V_{PP} / 75 ohm
- 4 - Video C 0.3 V_{PP} / 75 ohm



AV3 Cinch: Video CVBS - In, Audio - In

- Ye - Video CVBS 1 V_{PP} / 75 ohm
- Wh - Audio L 0.5 V_{RMS} / 10 kohm
- Rd - Audio R 0.5 V_{RMS} / 10 kohm



AV2 Cinch: Video YPbPr - In, Audio - In

- Gn - Video Y 1 V_{PP} / 75 ohm
- Bu - Video Pb 0.7 V_{PP} / 75 ohm



1 - D2+

Data channel

2 - Shield

Gnd

3 - D2-

Data channel

4 - D1+

Data channel

5 - Shield

Gnd

6 - D1-

Data channel

7 - D0+

Data channel

8 - Shield

Gnd

9 - D0-

Data channel

10 - CLK+

Data channel

11 - Shield

Gnd

12 - CLK-

Data channel

13 - n.c.

14 - n.c.

15 - DDC_SCL

DDC clock

16 - DDC_SDA

DDC data

17 - Ground

Gnd

18 - +5V

19 - HPD

Hot Plug Detect

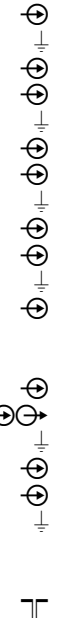
20 - Ground

Gnd

Aerial - In

- - F-type (US)

Coax, 75 ohm



1.3 Chassis Overview

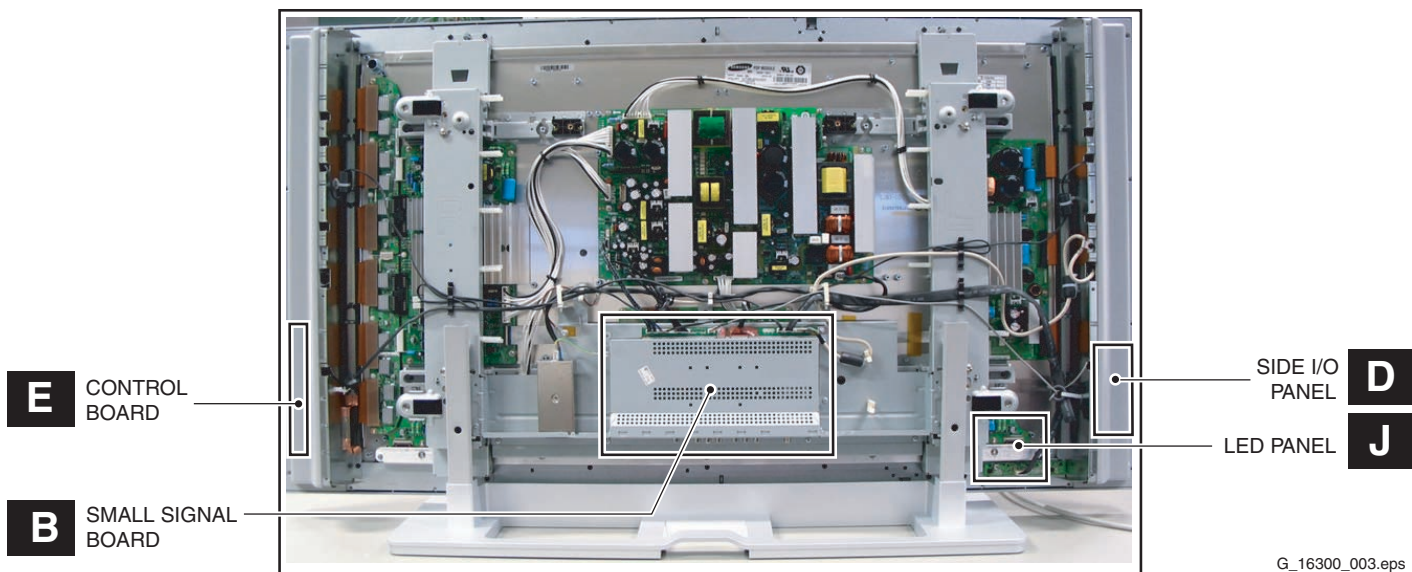


Figure 1-5 PWB/CBA locations (42 and 50-inch models)

2. Safety Instructions, Warnings, and Notes

Index of this chapter:

- 2.1 Safety Instructions
- 2.2 Warnings
- 2.3 Notes

2.1 Safety Instructions

Safety regulations require that **during** a repair:

- Connect the set to the Mains/AC Power via an isolation transformer (> 800 VA).
- Replace safety components, indicated by the symbol ▲, only by components identical to the original ones. Any other component substitution (other than original type) may increase risk of fire or electrical shock hazard.

Safety regulations require that **after** a repair, the set must be returned in its original condition. Pay in particular attention to the following points:

- Route the wire trees correctly and fix them with the mounted cable clamps.
- Check the insulation of the Mains/AC Power lead for external damage.
- Check the strain relief of the Mains/AC Power cord for proper function.
- Check the electrical DC resistance between the Mains/AC Power plug and the secondary side (only for sets which have a Mains/AC Power isolated power supply):
 1. Unplug the Mains/AC Power cord and connect a wire between the two pins of the Mains/AC Power plug.
 2. Set the Mains/AC Power switch to the "on" position (keep the Mains/AC Power cord unplugged!).
 3. Measure the resistance value between the pins of the Mains/AC Power plug and the metal shielding of the tuner or the aerial connection on the set. The reading should be between 4.5 Mohm and 12 Mohm.
 4. Switch "off" the set, and remove the wire between the two pins of the Mains/AC Power plug.
- Check the cabinet for defects, to avoid touching of any inner parts by the customer.

2.2 Warnings

- All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD ▲). Careless handling during repair can reduce life drastically. Make sure that, during repair, you are connected with the same potential as the mass of the set by a wristband with resistance. Keep components and tools also at this same potential. Available ESD protection equipment:
 - Complete kit ESD3 (small tablemat, wristband, connection box, extension cable and earth cable) 4822 310 10671.
 - Wristband tester 4822 344 13999.
- Be careful during measurements in the high voltage section.
- Never replace modules or other components while the unit is switched "on".
- When you align the set, use plastic rather than metal tools. This will prevent any short circuits and the danger of a circuit becoming unstable.

2.3 Notes

2.3.1 General

- Measure the voltages and waveforms with regard to the chassis (= tuner) ground (⊥), or hot ground (↕), depending on the tested area of circuitry. The voltages and waveforms shown in the diagrams are indicative. Measure them in the

Service Default Mode (see chapter 5) with a color bar signal and stereo sound (L: 3 kHz, R: 1 kHz unless stated otherwise) and picture carrier at 475.25 MHz for PAL, or 61.25 MHz for NTSC (channel 3).

- Where necessary, measure the waveforms and voltages with (⏏) and without (⏏) aerial signal. Measure the voltages in the power supply section both in normal operation (⏏) and in stand-by (⏏). These values are indicated by means of the appropriate symbols.
- The semiconductors indicated in the circuit diagram and in the parts lists, are interchangeable per position with the semiconductors in the unit, irrespective of the type indication on these semiconductors.
- Manufactured under license from Dolby Laboratories. "Dolby", "Pro Logic" and the "double-D symbol", are trademarks of Dolby Laboratories.

2.3.2 Schematic Notes

- All resistor values are in ohms and the value multiplier is often used to indicate the decimal point location (e.g. 2K2 indicates 2.2 kohm).
- Resistor values with no multiplier may be indicated with either an "E" or an "R" (e.g. 220E or 220R indicates 220 ohm).
- All capacitor values are given in micro-farads (μ = $\times 10^{-6}$), nano-farads (n= $\times 10^{-9}$), or pico-farads (p= $\times 10^{-12}$).
- Capacitor values may also use the value multiplier as the decimal point indication (e.g. 2p2 indicates 2.2 pF).
- An "asterisk" (*) indicates component usage varies. Refer to the diversity tables for the correct values.
- The correct component values are listed in the Spare Parts List. Therefore, always check this list when there is any doubt.

2.3.3 Rework on BGA (Ball Grid Array) ICs

General

Although (LF)BGA assembly yields are very high, there may still be a requirement for component rework. By rework, we mean the process of removing the component from the PWB and replacing it with a new component. If an (LF)BGA is removed from a PWB, the solder balls of the component are deformed drastically so the removed (LF)BGA has to be discarded.

Device Removal

As is the case with any component that, it is essential when removing an (LF)BGA, the board, tracks, solder lands, or surrounding components are not damaged. To remove an (LF)BGA, the board must be uniformly heated to a temperature close to the reflow soldering temperature. A uniform temperature reduces the chance of warping the PWB. To do this, we recommend that the board is heated until it is certain that all the joints are molten. Then carefully pull the component off the board with a vacuum nozzle. For the appropriate temperature profiles, see the IC data sheet.

Area Preparation

When the component has been removed, the vacant IC area must be cleaned before replacing the (LF)BGA. Removing an IC often leaves varying amounts of solder on the mounting lands. This excessive solder can be removed with either a solder sucker or solder wick. The remaining flux can be removed with a brush and cleaning agent.

After the board is properly cleaned and inspected, apply flux on the solder lands and on the connection balls of the (LF)BGA.

Note: Do not apply solder paste, as this has shown to result in problems during re-soldering.

Device Replacement

The last step in the repair process is to solder the new component on the board. Ideally, the (LF)BGA should be aligned under a microscope or magnifying glass. If this is not possible, try to align the (LF)BGA with any board markers. So as not to damage neighboring components, it may be necessary to reduce some temperatures and times.

More Information

For more information on how to handle BGA devices, visit this URL: www.atyourservice.ce.philips.com (needs subscription, not available for all regions). After login, select "Magazine", then go to "Repair Downloads". Here you will find Information on how to deal with BGA-ICs.

2.3.4 Lead Free Solder

Philips CE is producing lead-free sets (PBF) from 1.1.2005 onwards.

Identification: The bottom line of a type plate gives a 14-digit serial number. Digits 5 and 6 refer to the production year, digits 7 and 8 refer to production week (in example below it is 1991 week 18).



Figure 2-1 Serial number example

Regardless of the special lead-free logo (which is not always indicated), one must treat all sets from this date onwards according to the rules as described below.

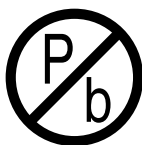


Figure 2-2 Lead-free logo

Due to lead-free technology some rules have to be respected by the workshop during a repair:

- Use only lead-free soldering tin Philips SAC305 with order code 0622 149 00106. If lead-free solder paste is required, please contact the manufacturer of your soldering equipment. In general, use of solder paste within workshops should be avoided because paste is not easy to store and to handle.
- Use only adequate solder tools applicable for lead-free soldering tin. The solder tool must be able
 - To reach at least a solder-tip temperature of 400°C.
 - To stabilize the adjusted temperature at the solder-tip.
 - To exchange solder-tips for different applications.
- Adjust your solder tool so that a temperature around 360°C - 380°C is reached and stabilized at the solder joint. Heating time of the solder-joint should not exceed ~ 4 sec. Avoid temperatures above 400°C, otherwise wear-out of tips will rise drastically and flux-fluid will be destroyed. To avoid wear-out of tips, switch "off" unused equipment or reduce heat.
- Mix of lead-free soldering tin/parts with leaded soldering tin/parts is possible but PHILIPS recommends strongly to

avoid mixed regimes. If not to avoid, clean carefully the solder-joint from old tin and re-solder with new tin.

- Use only original spare-parts listed in the Service-Manuals. Not listed standard material (commodities) has to be purchased at external companies.
- Special information for lead-free BGA ICs: these ICs will be delivered in so-called "dry-packaging" to protect the IC against moisture. This packaging may only be opened short before it is used (soldered). Otherwise the body of the IC gets "wet" inside and during the heating time the structure of the IC will be destroyed due to high (steam-)pressure inside the body. If the packaging was opened before usage, the IC has to be heated up for some hours (around 90°C) for drying (think of ESD-protection!).
Do not re-use BGAs at all!
- For sets produced before 1.1.2005, containing leaded soldering tin and components, all needed spare parts will be available till the end of the service period. For the repair of such sets nothing changes.

In case of doubt whether the board is lead-free or not (or with mixed technologies), you can use the following method:

- Always use the highest temperature to solder, when using SAC305 (see also instructions below).
- De-solder thoroughly (clean solder joints to avoid mix of two alloys).

Caution: For BGA-ICs, you **must** use the correct temperature-profile, which is coupled to the 12NC. For an overview of these profiles, visit the website www.atyourservice.ce.philips.com (needs subscription, but is not available for all regions) You will find this and more technical information within the "Magazine", chapter "Repair Downloads".

For additional questions please contact your local repair help desk.

2.3.5 Practical Service Precautions

- **It makes sense to avoid exposure to electrical shock.** While some sources are expected to have a possible dangerous impact, others of quite high potential are of limited current and are sometimes held in less regard.
- **Always respect voltages.** While some may not be dangerous in themselves, they can cause unexpected reactions that are best avoided. Before reaching into a powered TV set, it is best to test the high voltage insulation. It is easy to do, and is a good service precaution.

Introduction

Philips offers software upgrade capability for your TV using portable memory.
After you have completed a software upgrade, your TV will typically perform better.
What improvements are made depends on the upgrade software you are using as well as the software your TV contained before the upgrade.
You can execute the software upgrade procedure yourself.
Be aware that the content of this document is addressing technical or software skilled users.

Preparing a portable memory for software upgrade

For the procedure you will require:
• A personal computer with web browsing capability
• An archive utility that supports the ZIP-format (e.g. WinZip for Windows or Stuffit for Mac OS)
• A preferably empty USB memory stick or memory card (if available). Supported memory cards (if available): CompactFlash Card Type I & II, IBM Microdrive, Memory Stick, SecureDigital Card / Mini SD Card, SmartMedia Card, MultiMedia Card.
Note: Only FAT/DOS formatted portable memory is supported.

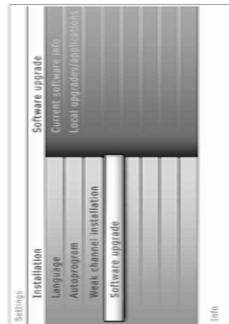
New software can be obtained from your dealer or can be downloaded from the www.philips.com/support website:

- 1 Go to www.philips.com/support using the web browser on your PC.
 - 2 Follow the procedure to find the information and the software related to your TV.
 - 3 Select the latest software upgrade file and download it to your PC.
 - 4 Decompress the ZIP file and copy the file "autorun.upg" to the root directory of the USB portable memory.
- Note: Only use software upgrades that can be found on the www.philips.com/support web site.*

Verifying the version of the TV software

Before starting the software upgrade procedure, it is advised to check what the current TV software is.

- 1 Select **Software Upgrade** in the Installation menu.
- 2 Press the cursor right.
The Software Upgrade menu moves to the left panel.
- 3 Select **Current Software Info** to observe the version and the description of the current software.



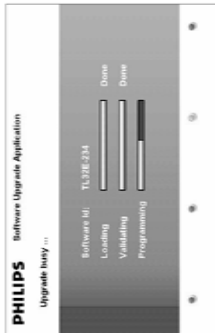
3. Directions for Use

You can download this information from the following websites:
<http://www.philips.com/support>
<http://www.p4c.philips.com>

As the software upgrade is a new feature, it is explained below.

Automatic software upgrade procedure

- 1 Power off your TV and remove all memory devices.
 - 2 Insert the USB portable memory that contains the downloaded software upgrade.
 - 3 Switch on your TV with the power switch at the right side of the TV.
 - 4 At startup the TV will scan the USB portable memory until it finds the update content. The TV will automatically go to the upgrade mode. After a few seconds it will display the status of the upgrade procedure.
- Warning**
- You are not allowed to remove the USB portable memory during the software upgrade procedure!
 - In case of a power drop during the upgrade procedure, don't remove the USB portable memory from the TV. The TV will continue the upgrade as soon as the power comes back.
 - If you try to upgrade to a software version lower than the current version, a confirmation will be asked. Downgrading to older software should only be done in case of real necessity.
 - If an error occurs during the upgrade, you should retry the procedure or contact your dealer.
- 5 When the software upgrade was successful, remove the USB portable memory and restart your TV with the power switch at the right side of the TV.
Your TV will start up with the new software.
Note: Once the upgrade is finished use your PC to remove the TV software from your USB portable memory.



Manual software upgrade procedure

For a manual software upgrade copy the "autorun.upg" file in a directory called "Upgrades" located in the root of the USB portable memory.

- 1 Insert the portable memory that contains the downloaded software upgrade.
- 2 Select **Software Upgrade** in the Installation menu. Go to **Local upgrade/applications**.
The TV will list all compatible images available on the USB portable memory and display the data for each selected upgrade image.
- 3 Select the correct upgrade image and press the red color button to start the upgrade.
Your TV will restart and will automatically go to the upgrade mode. After a few seconds it will display the status of the upgrade procedure.

Warning
If you try to upgrade to a software version equal or lower than the current version, a confirmation will be asked. Downgrading to older software should only be done in case of real necessity.

- 4 When the software upgrade was successful, remove the USB portable memory and restart your TV with the power switch at the right side of the TV.
Your TV will start up with the new software.

4. Mechanical Instructions

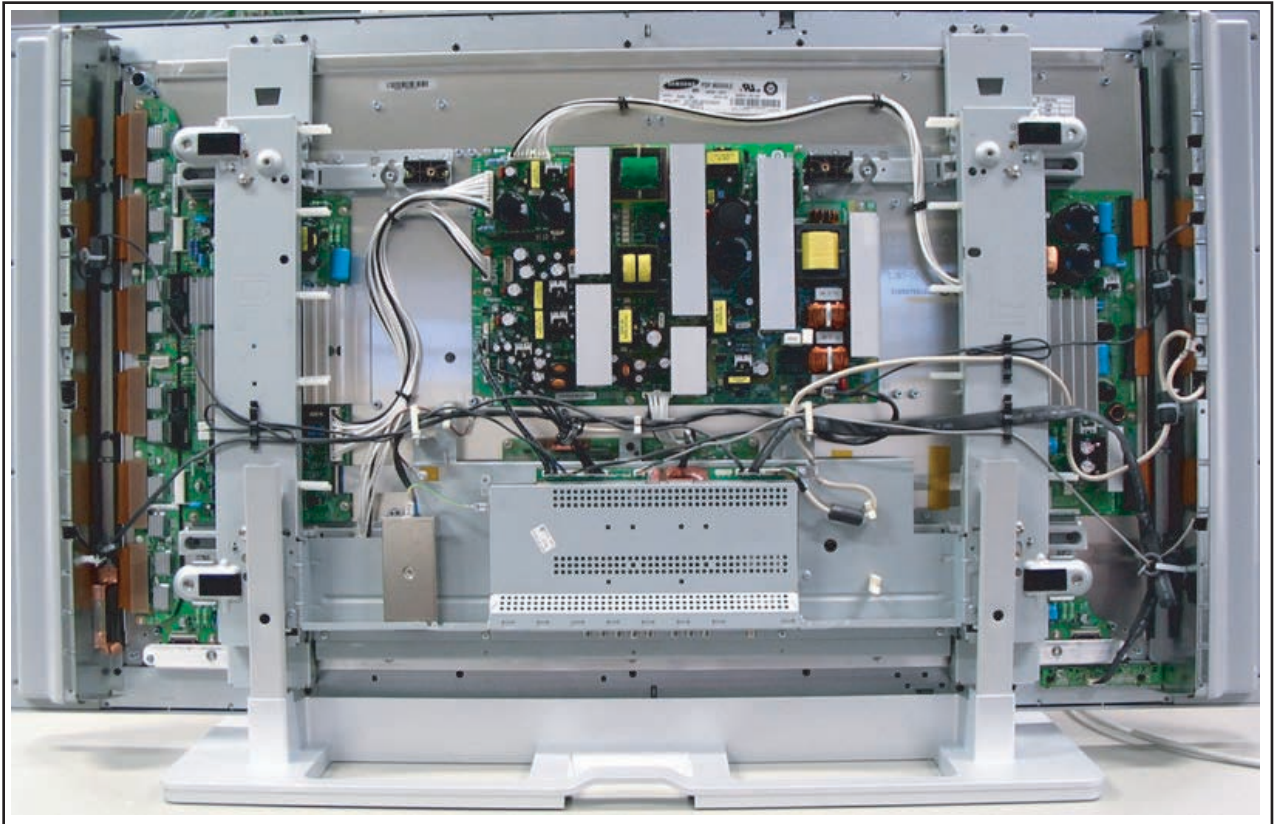
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- 4.2 Service Positions
- 4.3 Assy/Panel Removal
- 4.4 Set Re-assembly

Notes:

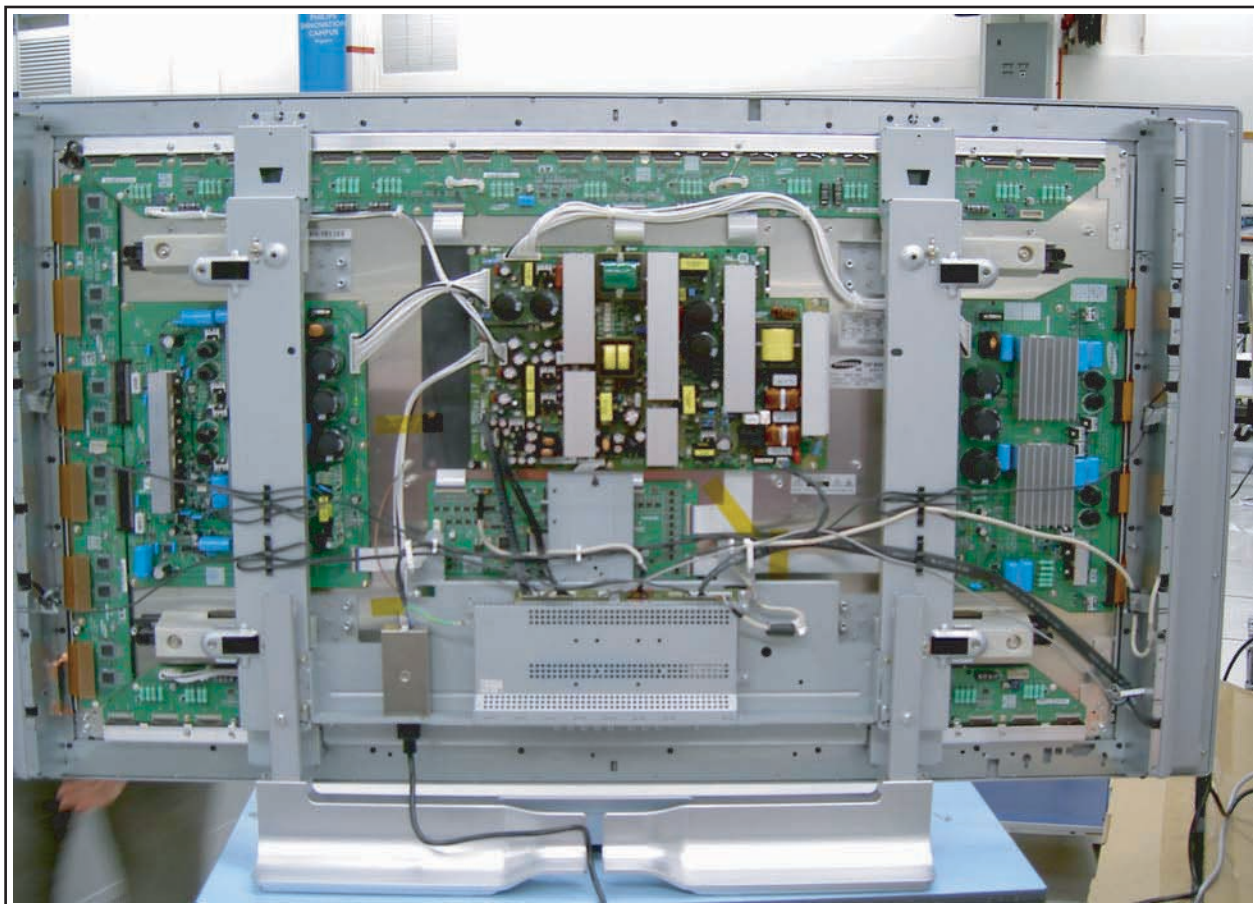
- Several models in this chassis range have a different mechanical construction, the instructions given in this chapter are therefore very model specific.
- Figures below can deviate slightly from the actual situation, due to the different set executions.
- Follow the disassemble instructions in described order.

4.1 Cable Dressing



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Figure 4-1 Cable dressing (42-inch model)



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Figure 4-2 Cable dressing (50-inch model)

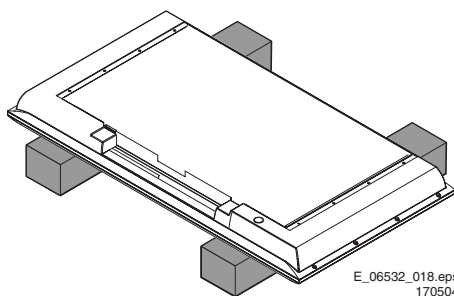
4.2 Service Positions

For easy servicing of this set, there are a few possibilities created:

- Foam bars (created for Service).
- Aluminium service stands (created for Service).

4.2.2 Aluminium Stands

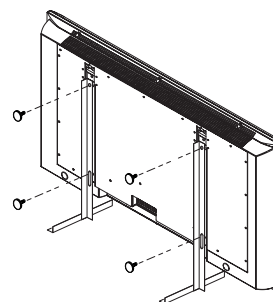
4.2.1 Foam Bars



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Figure 4-3 Foam bars

The foam bars (order code 3122 785 90580 for two pieces) can be used for all types and sizes of Flat TVs. By laying the TV face down on the (ESD protective) foam bars, a stable situation is created to perform measurements and alignments. By placing a mirror under the TV, you can monitor the screen.



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Figure 4-4 Aluminium stands (drawing of MkI)

The new MkII aluminium stands (not on drawing) with order code 3122 785 90690, can also be used to do measurements, alignments, and duration tests. The stands can be (dis)mounted quick and easy by means of sliding them in/out the "mushrooms". The new stands are backwards compatible with the earlier models.

Important: For (older) FTV sets without these "mushrooms", it is obligatory to use the provided screws, otherwise it is possible to damage the monitor inside!

4.3 Assy/Panel Removal

4.3.1 Metal Rear Cover

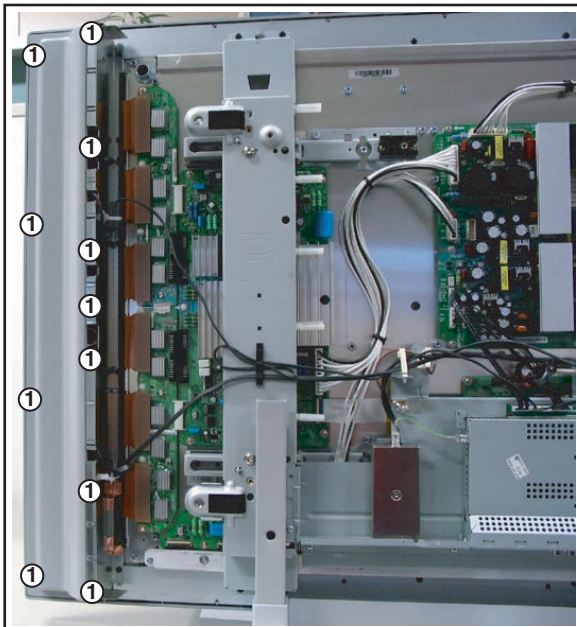
Caution: Disconnect the Mains/AC Power cord before you remove the rear cover!

1. Place the TV set upside down on a table top, using the foam bars (see part "Foam Bars").
Caution: do **not** put pressure on the display, but let the monitor lean on the speakers or the Front cover.
2. Remove all T10 screws around the edges of the metal rear cover: "parker" screws around the outer rim, "tapping" screws around the connector plate.
3. Remove the four "mushrooms" from the rear cover.
4. Lift the metal rear cover from the set. Make sure that wires and flat foils are not damaged.

4.3.2 Speaker Compartment Cover

After removing the metal rear cover, you gain access to the Speaker Compartment covers.

1. Remove all screws [1] (see Figure "Speaker compartment cover removal").
2. For removal of the right cover, note that the I/O connection cable has to be removed as well.
3. After removal of all the screws, put a screwdriver between the side of the cover and the front cabinet and slightly push it upwards so you can take the cover out.



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Figure 4-5 Speaker compartment cover removal

4.3.3 Control Panel

After removal of the left Speaker Compartment Cover, this panel is accessible. Release the clamps and take out the panel.

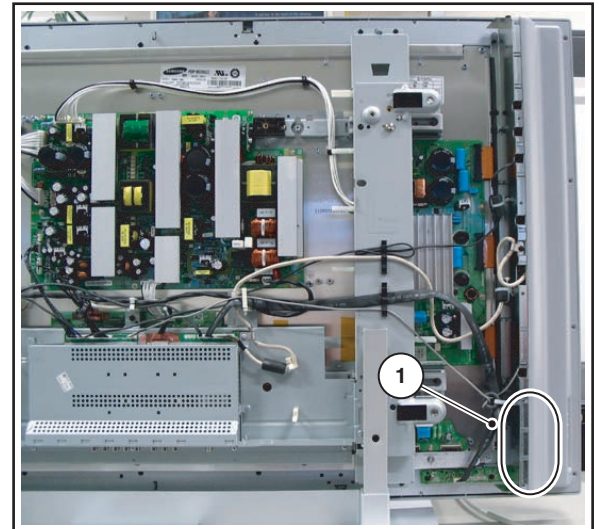
4.3.4 Speakers

After removal of the Speaker Compartment Covers, you can access the speakers.

4.3.5 Side I/O Panel

You will find the Side I/O Panel on the inside of the right Speaker Compartment Cover. After removal of this cover, this panel is accessible.

1. Disconnect the cable(s) from the panel.
 2. Remove the T10 mounting screws that hold the assy.
 3. Take out the panel [1] from its bracket.
- When defective, replace the whole unit.

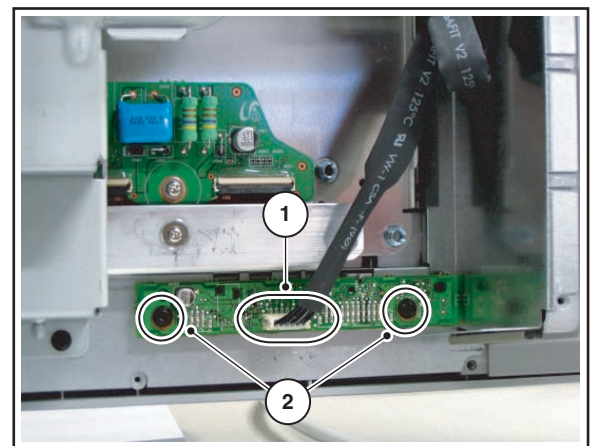


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Figure 4-6 Side I/O panel removal

4.3.6 LED Panel

1. Disconnect the cable [1] from the panel.
 2. Remove the T10 mounting screws [2] that hold the panel.
 3. Take out the panel.
- When defective, replace the whole unit.

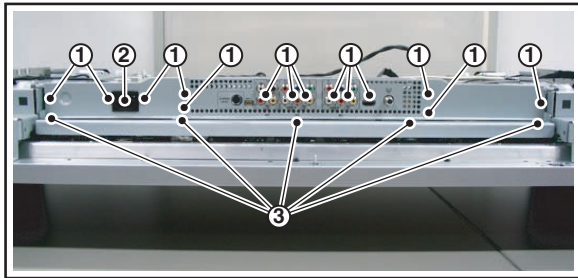


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Figure 4-7 LED panel removal

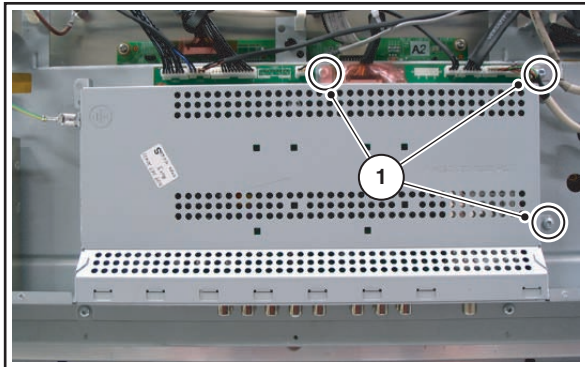
4.3.7 Small Signal Board (SSB)

1. Remove all SSB bottom shielding fixation screws [1] and [3] at the connector plate (bottom side). See Figure “SSB bottom shielding”.
2. Remove the mains supply unit [2] after having unplugged the earthcable from the SSB top shielding plate.
3. Take out the SSB bottom shielding plate.
4. Remove all SSB top shielding fixation screws [1]. See Figure “SSB top shielding”.
5. Take out the SSB top shielding plate; it hinges at the left side.
6. Remove the fixation screws of the connector plate itself.
7. Unplug all cables on the SSB.
8. Lift the panel from the set.



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Figure 4-8 SSB bottom shielding

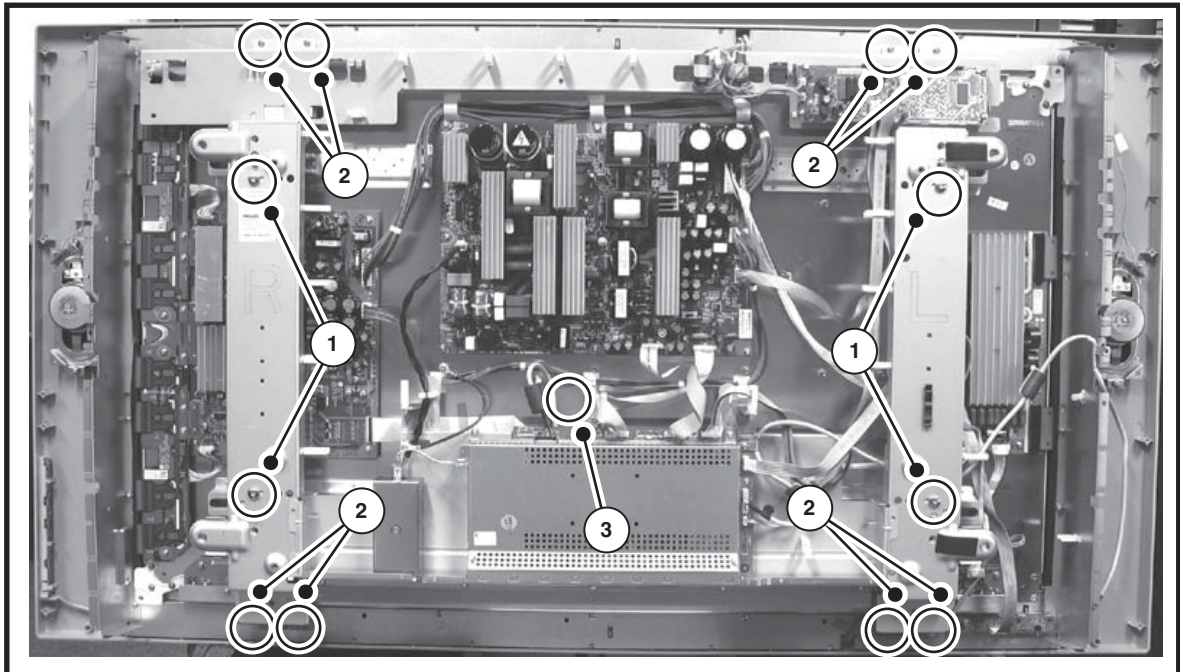


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Figure 4-9 SSB top shielding

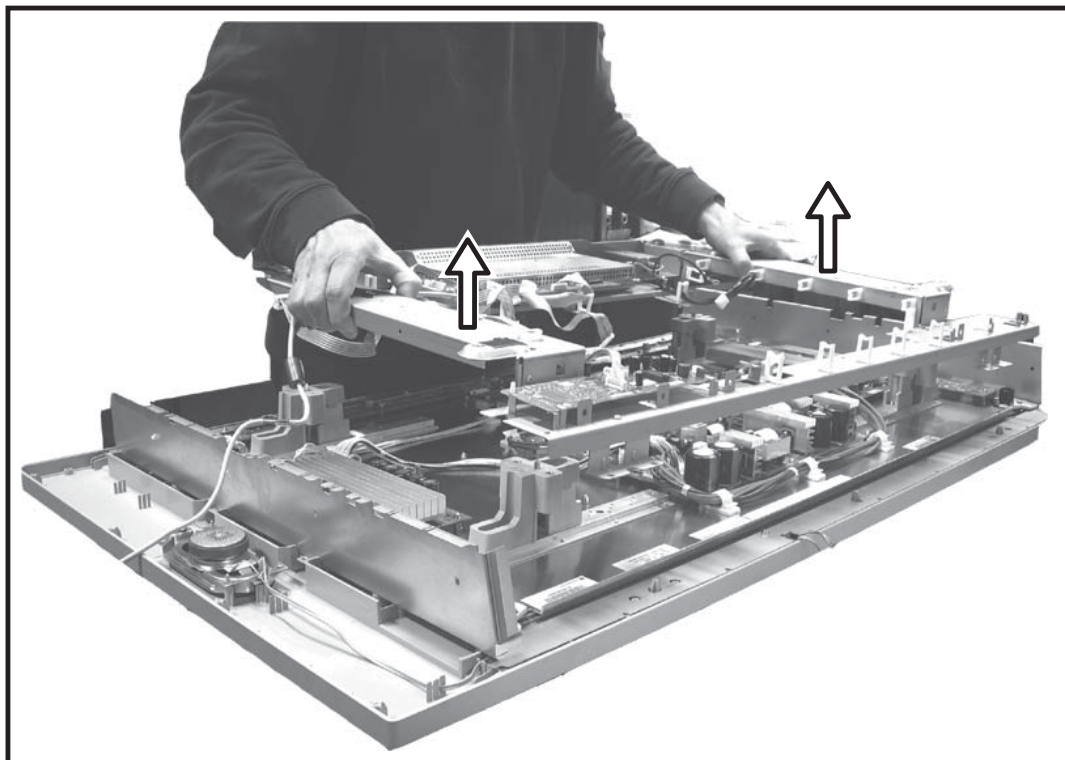
4.3.8 Plasma Display Panel / Glass Plate

1. Remove the T20 display panel mounting screws [1].
2. Remove the T10 [2] and the T15 [3] screws from the mounting frame.
3. Unplug all cable(s):
 - LVDS cable at SSB side (fragile connector!).
 - SSB supply cables at the Main Supply board.
 - Mains cable at the Main Supply board.
 - Side I/O cable at SSB side (fragile connector!).
- Cable at LED panel.
- Keyboard cable at SSB side.
- Audio Amplifier supply cable at the Main Supply board.
- Loudspeaker cables (incl. ferrites) at the Audio panel.
4. Lift the metal frame (together with all PWBs) from the display panel (see figure “Frame lift”).
5. After removal of the frame, lift the PDP from the set.



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Figure 4-10 Display panel removal (photo from LC4.9 chassis)



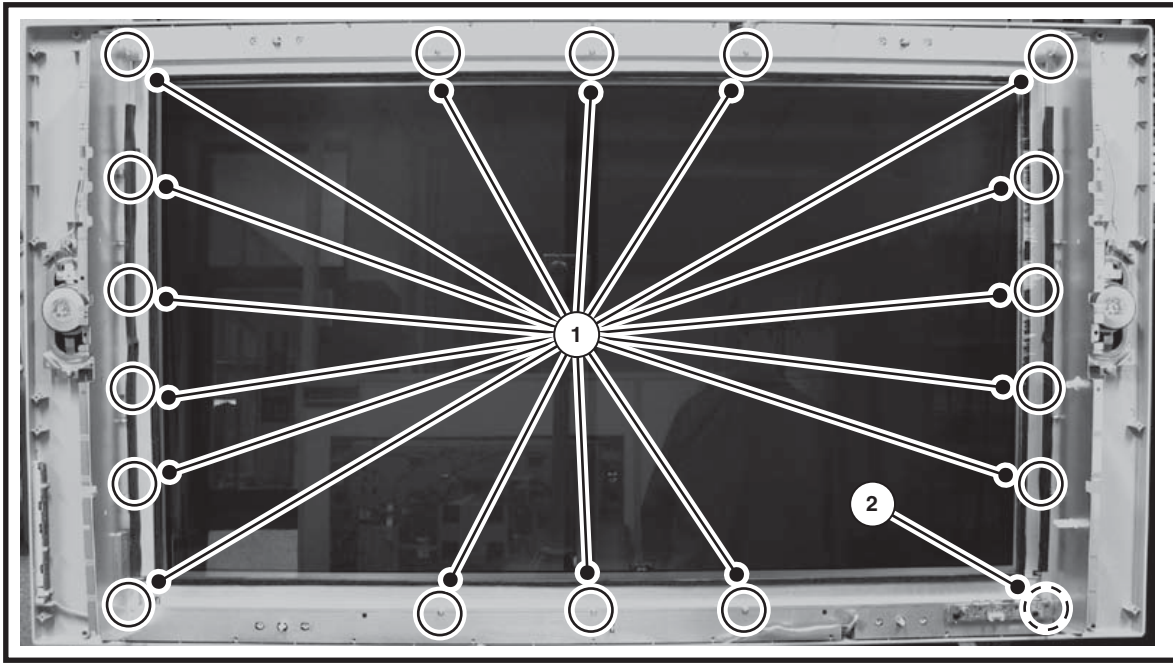
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Figure 4-11 Frame lift (photo from LC4.9 chassis)

4.3.9 PDP Glass Plate

In order to remove/exchange the PDP glass plate:

1. Remove the PDP as described earlier.
2. Remove the LED panel [2] as described previously in this chapter.
3. Remove the T10 screws [1] from the mounting frame. See Figure "Glass plate removal (photo from LC4.9 chassis)".
4. After removal of the frame, you can lift the glass plate from the set.



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Figure 4-12 Glass plate removal (photo from LC4.9 chassis)

4.4 Set Re-assembly

To re-assemble the whole set, execute all processes in reverse order.

Notes:

- While re-assembling, make sure that all cables are placed and connected in their original position. See figure "Cable dressing".
- Pay special attention not to damage the EMC foams on the SSB shields. Ensure that EMC foams are mounted correctly.

5. Service Modes, Error Codes, and Fault Finding

Index of this chapter:

- 5.1 Test Points
- 5.2 Service Modes
- 5.3 Stepwise Start-up
- 5.4 Service Tools
- 5.5 Error Codes
- 5.6 The Blinking LED Procedure
- 5.7 Protections
- 5.8 Fault Finding and Repair Tips
- 5.9 Software Upgrading

5.1 Test Points

As most signals are digital, it will be almost impossible to measure waveforms with a standard oscilloscope. Therefore, waveforms are not given in this manual. Several key ICs are capable of generating test patterns, which can be controlled via ComPair. In this way it is possible to determine which part is defective.

Perform measurements under the following conditions:

- Service Default Mode.
- Video: Color bar signal.
- Audio: 3 kHz left, 1 kHz right.

5.2 Service Modes

Service Default Mode (SDM) and Service Alignment Mode (SAM) offer several features for the service technician, while the Customer Service Mode (CSM) is used for communication between a Customer Helpdesk and a customer.

There is also the option of using ComPair, a hardware interface between a computer (see requirements below) and the TV chassis. It offers the ability of structured troubleshooting, test pattern generation, error code reading, software version readout, and software upgrading.

Minimum requirements for ComPair: a Pentium processor, Windows 95/98, and a CD-ROM drive (see also paragraph "ComPair").

5.2.1 Service Default Mode (SDM)

Purpose

- To create a pre-defined setting, to get the same measurement results as given in this manual.
- To override SW protections (only applicable for protections detected by stand-by processor) and make the TV start up to the step just before protection (a sort of automatic stepwise start up). See paragraph "Stepwise Start Up".
- To start the blinking LED procedure (not valid in protection mode).

Specifications

Table 5-1 SDM default settings

Region	Freq. (MHz)	Default system
Europe, AP-PAL/Multi	475.25	PAL B/G
NAFTA, AP-NTSC, LATAM	61.25 (ch. 3)	NTSC M

- Tuning frequency 61.25 MHz for NTSC: The TV shall tune to physical channel 3 only if channel 3 is an analog channel or if there is no channel 3 installed in the channel map. If there is a digital channel installed in channel 3, then the frequency to which the set will tune, would be as specified

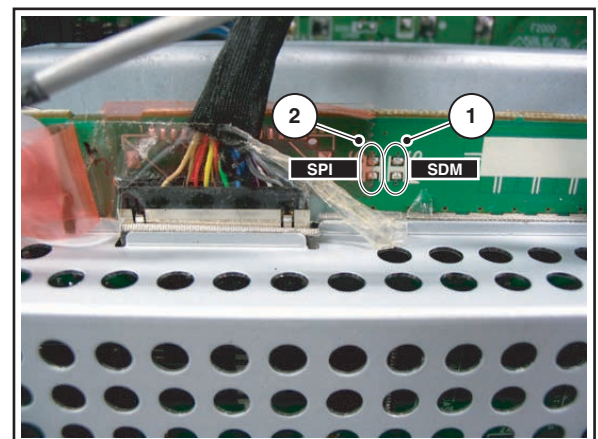
in the channel map and could be different from the one corresponding to the physical channel 3.

- All picture settings at 50% (brightness, color, contrast).
- All sound settings at 50%, except volume at 25%.
- All service-unfriendly modes (if present) are disabled, like:
 - (Sleep) timer.
 - Child/parental lock.
 - Picture mute (blue mute or black mute).
 - Automatic volume levelling (AVL).
 - Auto switch "off" (when no video signal was received for 10 minutes).
 - Skip/blank of non-favorite pre-sets.
 - Smart modes.
 - Auto store of personal presets.
 - Auto user menu time-out.

How to Activate SDM

Use one of the following methods:

- Use the standard RC-transmitter and key in the code "062596", directly followed by the "MENU" button.
Note: It is possible that, together with the SDM, the main menu will appear. To switch it "off", push the "MENU" button again.
- Short for a moment the two solder pads [1] on the SSB, with the indication "SDM". They are located outside the shielding. Activation can be performed in all modes, except when the set has a problem with the Stand-by Processor. See figure "SDM and SDI service pads".



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Figure 5-1 SDM and SDI service pads

After activating this mode, "SDM" will appear in the upper right corner of the screen (if you have picture).

How to Navigate

When you press the "MENU" button on the RC transmitter, the set will toggle between the SDM and the normal user menu (with the SDM mode still active in the background).

How to Exit SDM

Use one of the following methods:

- Switch the set to STAND-BY via the RC-transmitter.
- Via a standard customer RC-transmitter: key in "00"-sequence.

5.2.2 Service Alignment Mode (SAM)

Purpose

- To perform (software) alignments.
- To change option settings.
- To easily identify the used software version.

- To view operation hours.
- To display (or clear) the error code buffer.

How to Activate SAM

Via a standard RC transmitter: key in the code "062596" directly followed by the "INFO" button. After activating SAM with this method a service warning will appear on the screen, you can continue by pressing the red button on the RC.

Contents of SAM:

- **Hardware Info.**
 - **A. VIPER SW Version.** Displays the software version of the VIPER software (main software) (**example:** EP23U-1.2.3.4_12345 = AAAAB_X.Y.W.Z_NNNNN).
 - **AAAA**= the chassis name.
 - **B**= the region: A= AP, E= EU, L= Latam, U = US.
 - **X.Y.W.Z**= the software version, where X is the main version number (different numbers are not compatible with one another) and Y is the sub version number (a higher number is always compatible with a lower number). The last two digits are used for development reasons only, so they will always be zero in official releases.
 - **NNNNN**= last five digits of 12nc code of the software.
 - **B. SBY PROC Version.** Displays the software version of the stand-by processor.
 - **C. Production Code.** Displays the production code of the TV, this is the serial number as printed on the back of the TV set. Note that if an NVM is replaced or is initialized after corruption, this production code has to be re-written to NVM. ComPair will foresee in a possibility to do this.
- **Operation Hours.** Displays the accumulated total of operation hours (not the stand-by hours). Every time the TV is switched "on/off", 0.5 hours is added to this number.
- **Errors.** (Followed by maximal 10 errors). The most recent error is displayed at the upper left (for an error explanation see paragraph "Error Codes").
- **Defective Module.** Here the module that generates the error is displayed. If there are multiple errors in the buffer, which are not all generated by a single module, there is probably another defect. It will then display the message "UNKNOWN" here.
- **Reset Error Buffer.** When you press "cursor right" and then the "OK" button, the error buffer is reset.
- **Alignments.** This will activate the "ALIGNMENTS" sub-menu.
- **Dealer Options.** Extra features for the dealers.
- **Options.** Extra features for Service.
- **Initialise NVM.** When an NVM was corrupted (or replaced) in the former EMG based chassis, the microprocessor replaces the content with default data (to assure that the set can operate). However, all preferences and alignment values are gone now, and option numbers are not correct. Therefore, this was a very drastic way. In this chassis, the procedure is implemented in another way: The moment the processor recognizes a corrupted NVM, the "initialize NVM" line will be highlighted. Now, you can do two things (dependent of the service instructions at that moment):
 - Save the content of the NVM via ComPair for development analysis, **before** initializing. This will give the Service department an extra possibility for diagnosis (e.g. when Development asks for this).
 - Initialize the NVM (same as in the past, however now it happens conscious).

Note: When you have a corrupted NVM, or you have replaced the NVM, there is a high possibility that you will not have picture any more because your display option is not correct. So, before you can initialize your NVM via the SAM, you need to have a picture and therefore you need the correct display option. To adapt this option, use ComPair. The correct HEX values for the options can be found in the table below.

Table 5-2 Display option code overview (all FTV chassis)

Display Option	HEX	Display Type	Size	Vertical Resolution
000	00	PDP SDI	42"	768p
001	01	PDP SDI	50"	768p
002	02	PDP FHP	42"	1024i
003	03	LCD LPL	30"	768p
004	04	LCD LPL	37"	768p
005	05	LCD LPL	42"	768p
006	06	SHARP	32"	768p
007	07	PDP SDI V3	42"	480p
008	08	PDP FHP 1024i	37"	1024i
009	09	LCOS XION	-	720p
010	0A	LCD AUO	30"	768p
011	0B	LCD LPL	32"	768p
012	0C	LCD AUO	32"	768p
013	0D	LCD SHARP	37"	768p
014	0E	LCD LPL	42"	1080p
015	0F	PDP SDI	37"	480p
016	10	PDP FHP	37"	1080i
017	11	PDP FHP	42"	1080i
018	12	PDP FHP	55"	768p
019	13	LCOS VENUS	-	720p
020	14	LCOS VENUS	-	1080p
021	15	LCD LPL	26"	768p
022	16	LCD LPL	32"	768p
023	17	LG SD	42"	480p
024	18	PDP SDI V4	42"	480p
025	19	PDP SDI V4	42"	768p
026	1A	PDP FHP A2	42"	1024i
027	1B	PDP SDI HD V4	50"	768p
028	1C	LCD Sharp	37"	1080p
029	1D	LCD AUO	32"	768p
030	1E	LCD Sharp	37"	1080p
031	1F	LCD Sharp	37"	1080p
032	20	LCD LPL	20"	768p
033	21	LCD QDI	23"	768p
034	22	ECO PTV	51"	1080i
035	23	ECO PTV	55"	1080i
036	24	ECO PTV	61"	1080i
037	25	PDP FHP A3	42"	1024i
038	26	DLP	50"	720p
039	27	DLP	60"	720p
040	28	LCD Sharp	32"	768p
041	29	LCD Sharp	32"	768p
042	2A	PDP SDI V4	63"	768p
043	2B	LCD Sharp	37"	768p
044	2C	LCD Sharp	37"	768p
045	2D	LCD LPL	26"	768p

- **Store.** All options and alignments are stored when pressing "cursor right" and then the "OK"-button
- **SW Maintenance.**
 - **SW Events.** Not useful for service purposes. In case of specific software problems, the development department can ask for this info.
 - **HW Events.** Not functional at the moment this manual is released, description will be published in an update manual if the function becomes available.
- **Operation hours PDP.** Displays the accumulated total of PDP operation hours.

How to Navigate

- In SAM, you can select the menu items with the "CURSOR UP/DOWN" key on the RC-transmitter. The selected item will be highlighted. When not all menu items fit on the screen, move the "CURSOR UP/DOWN" key to display the next/previous menu items.
- With the "CURSOR LEFT/RIGHT" keys, it is possible to:
 - (De) activate the selected menu item.
 - (De) activate the selected submenu.

How to Exit SAM

Use one of the following methods:

- Press the "MENU" button on the RC-transmitter.
- Switch the set to STAND-BY via the RC-transmitter.

Note: As long as SAM is activated, it is not possible to change a channel. This could hamper the White Point alignments because you cannot choose your channel/frequency any more. Workaround: after you have sent the RC code "062596 INFO" you will see the service-warning screen, and in this stage it is still possible to change the channel (so before pressing the "OK" button).

5.2.3 Customer Service Mode (CSM)**Purpose**

When a customer is having problems with his TV-set, he can call his dealer or the Customer Helpdesk. The service technician can then ask the customer to activate the CSM, in order to identify the status of the set. Now, the service technician can judge the severity of the complaint. In many cases, he can advise the customer how to solve the problem, or he can decide if it is necessary to visit the customer. The CSM is a read only mode; therefore, modifications in this mode are not possible.

How to Activate CSM

Key in the code "123654" via the standard RC transmitter.

Note: Activation of the CSM is only possible if there is no (user) menu on the screen!

How to Navigate

By means of the "CURSOR-DOWN/UP" knob on the RC-transmitter, you can navigate through the menus.

Contents of CSM

- **SW Version (example: EP23U-1.2.3.4_12345).** Displays the built-in main software version. In case of field problems related to software, software can be upgraded. As this software is consumer upgradeable, it will also be published on the Internet.
- **SBY Processor Version.** Displays the built-in stand-by processor software version. Upgrading this software will be possible via a PC and a ComPair interface (see chapter Software upgrade).
- **Set Type.** This information is very helpful for a helpdesk/workshop as reference for further diagnosis. In this way, it is not necessary for the customer to look at the rear of the TV-set. Note that if an NVM is replaced or is initialized after corruption, this set type has to be re-written to NVM. ComPair will foresee a possibility to do this.
- **Production Code.** Displays the production code (the serial number) of the TV. Note that if an NVM is replaced or is initialized after corruption, this production code has to be re-written to NVM. ComPair will foresee a possibility to do this.
- **Code 1.** Gives the latest five errors of the error buffer. As soon as the built-in diagnose software has detected an error the buffer is adapted. The last occurred error is displayed on the leftmost position. Each error code is displayed as a 2-digit number. When less than 10 errors occur, the rest of the buffer is empty (00). See also paragraph Error Codes for a description.
- **Code 2.** Gives the first five errors of the error buffer. See also paragraph Error Codes for a description.
- **Headphone Volume.** Gives the last status of the headphone volume, as set by the customer. The value can vary from 0 (volume is minimum) to 100 (volume is maximum). Change via "MENU", "TV", "SOUND", "HEADPHONE VOLUME".
- **Dolby.** Indicates whether the received transmitter transmits Dolby sound ("ON") or not ("OFF"). Attention: The presence of Dolby can only be tested by the software on

the Dolby Signaling bit. If a Dolby transmission is received without a Dolby Signaling bit, this indicator will show "OFF" even though a Dolby transmission is received.

- **Sound Mode.** Indicates the by the customer selected sound mode (or automatically chosen mode). Possible values are "STEREO" and "VIRTUAL DOLBY SURROUND". Change via "MENU", "TV", "SOUND", "SOUND MODE". It can also have been selected automatically by signaling bits (internal software).
- **Tuner Frequency.** Not applicable for US sets.
- **Digital Processing.** Indicates the selected digital mode. Possible values are "STANDARD" and "PIXEL PLUS". Change via "MENU", "TV", "PICTURE", "DIGITAL PROCESSING".
- **TV System.** Gives information about the video system of the selected transmitter.
 - M: NTSC M signal received
 - ATSC: ATSC signal received
- **Center Mode.** Not applicable.
- **DNR.** Gives the selected DNR setting (Dynamic Noise Reduction), "OFF", "MINIMUM", "MEDIUM", or "MAXIMUM". Change via "MENU", "TV", "PICTURE", "DNR".
- **Noise Figure.** Gives the noise ratio for the selected transmitter. This value can vary from 0 (good signal) to 127 (average signal) and to 255 (bad signal). For some software versions, the noise figure will only be valid when "Active Control" is set to "medium" or "maximum" before activating CSM.
- **Source.** Indicates which source is used and the video/audio signal quality of the selected source. (Example: Tuner, Video/NICAM) Source: "TUNER", "AV1", "AV2", "AV3", "HDMI 1", "SIDE". Video signal quality: "VIDEO", "S-VIDEO", "RGB 1FH", "YPBPR 1FH 480P", "YPBPR 1FH 576P", "YPBPR 1FH 1080I", "YPBPR 2FH 480P", "YPBPR 2FH 576P", "YPBPR 2FH 1080I", "RGB 2FH 480P", "RGB 2FH 576P" or "RGB 2FH 1080I". Audio signal quality: "STEREO", "SPDIF 1", "SPDIF 2", or "SPDIF".
- **Audio System.** Gives information about the audible audio system. Possible values are "Stereo", "Mono", "Mono selected", "Analog In: No Dig. Audio", "Dolby Digital 1+1", "Dolby Digital 1/0", "Dolby Digital 2/0", "Dolby Digital 2/1", "Dolby Digital 2/2", "Dolby Digital 3/0", "Dolby Digital 3/1", "Dolby Digital 3/2", "Dolby Digital Dual I", "Dolby Digital Dual II", "MPEG 1+1", "MPEG 1/0", "MPEG 2/0". This is the same info as you will see when pressing the "INFO" button in normal user mode (item "signal"). In case of ATSC receiving there will be no info displayed.
- **Tuned Bit.** Indicates if the selected preset is automatically tuned (via "Automatic Installation" in the setup menu) or via the automatic tuning system of the TV. In this case "Tuned bit" will show "YES". If the TV was not able to auto-tune to the correct frequency, this item will show "NO". So if "NO" is displayed, it could indicate that the customer has manually tuned to a frequency which was too far from a correct frequency, that the TV was not able to auto-tune any more.
- **Preset Lock.** Indicates if the selected preset has a child lock: "LOCKED" or "UNLOCKED". Change via "MENU", "TV", "CHANNELS", "CHANNEL LOCK".
- **Lock After.** Indicates at what time the channel lock is set: "OFF" or e.g. "18:45" (lock time). Change "MENU", "TV", "CHANNELS", "LOCK AFTER".
- **TV Ratings Lock.** Indicates the "TV ratings lock" as set by the customer. Change via "MENU", "TV", "CHANNELS", "TV RATINGS LOCK". Possible values are: "ALL", "NONE", "TV-Y", "TV-Y7", "TV-G", "TV-PG", "TV-14" and "TV-MA".
- **Movie Ratings Lock.** Indicates the "Movie ratings lock" as set by the customer. Change via "MENU", "TV", "CHANNELS", "MOVIE RATINGS LOCK". Possible values are: "ALL", "NR", "G", "PG", "PG-13", "R", "NC-17" and "X".
- **V-Chip Tv Status.** Indicates the setting of the V-chip as applied by the selected TV channel. Same values can be shown as for "TV RATINGS LOCK".

- **V-Chip Movie Status.** Indicates the setting of the V-chip as applied by the selected TV channel. Same values can be shown as for "MOVIE RATINGS LOCK".
- **Options 1.** Gives the option codes of option group 1 as set in SAM (Service Alignment Mode).
- **Options 2.** Gives the option codes of option group 2 as set in SAM (Service Alignment Mode).
- **AVL.** Indicates the last status of AVL (Automatic Volume Level): "ON" or "OFF". Change via "MENU", "TV", "SOUND", "AVL". AVL can not be set in case of digital audio reception (e.g. Dolby Digital or AC3)
- **Delta Volume.** Indicates the last status of the delta volume for the selected preset as set by the customer: from "-12" to "+12". Change via "MENU", "TV", "SOUND", "DELTA VOLUME".
- **HDMI key validity.** Indicates the key's validity.
- **IEEE key validity.** Indicates the key's validity (n.a.).
- **POD key validity.** Indicates the key's validity (n.a.).
- **Digital Signal Quality.** Indicates quality of the received digital signal (0= low).

How to Exit CSM

Press any key on the RC-transmitter (with exception of the "CHANNEL +/-", "VOLUME", "MUTE" and digit (0-9) keys).

the Stand-by Processor will enable the 3V3, but will not go to protection now. The TV will stay in this situation until it is reset (Mains/AC Power supply interrupted).

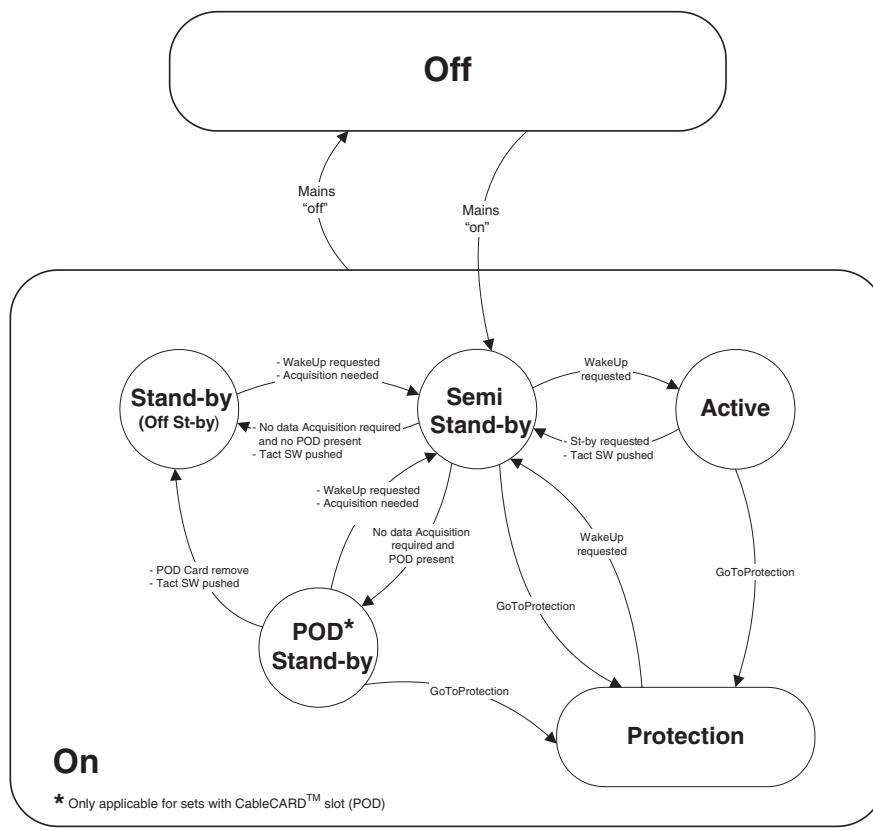
The abbreviations "SP" and "MP" in the figures stand for:

- SP: protection or error detected by the **Stand-by Processor**.
- MP: protection or error detected by the **VIPER Main Processor**.

5.3 Stepwise Start-up

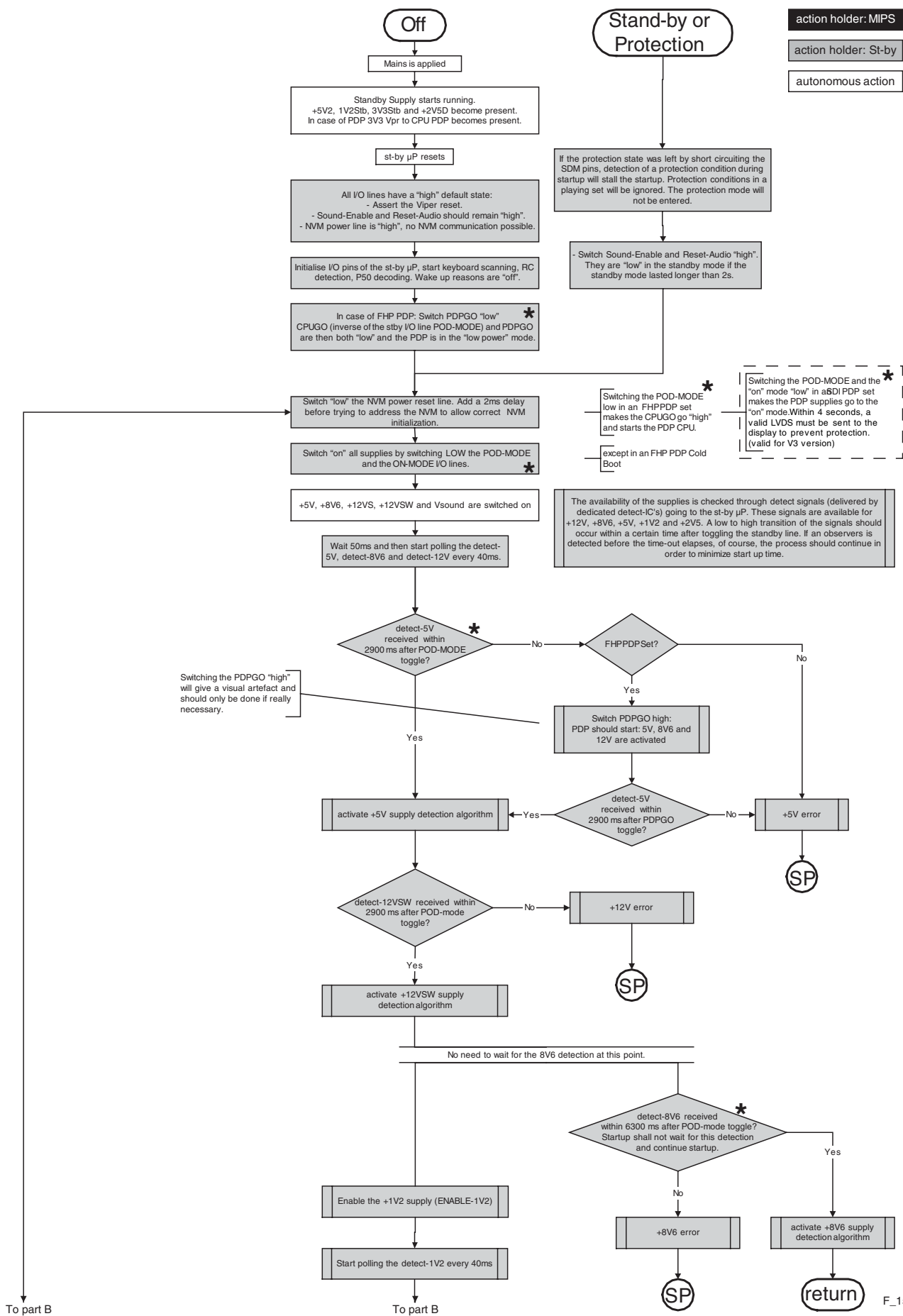
The stepwise start-up method, as known from FTL/FTP sets is not valid any more. The situation for this chassis is as follows: when the TV is in a protection state detected via the Stand-by Processor (and thus blinking an error) **and** SDM is activated via shortcutting the pins on the SSB, the TV starts up until it reaches the situation just before protection. So, this is a kind of automatic stepwise start-up. In combination with the start-up diagrams below, you can see which supplies are present at a certain moment.

Important to know here is, that if e.g. the 3V3 detection fails (and thus error 11 is blinking) **and** the TV is restarted via SDM,



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Figure 5-2 Transition diagram



* Only applicable for sets with CableCARD™ slot (POD)

Figure 5-3 "Off" to "Semi Stand-by" flowchart (part 1)

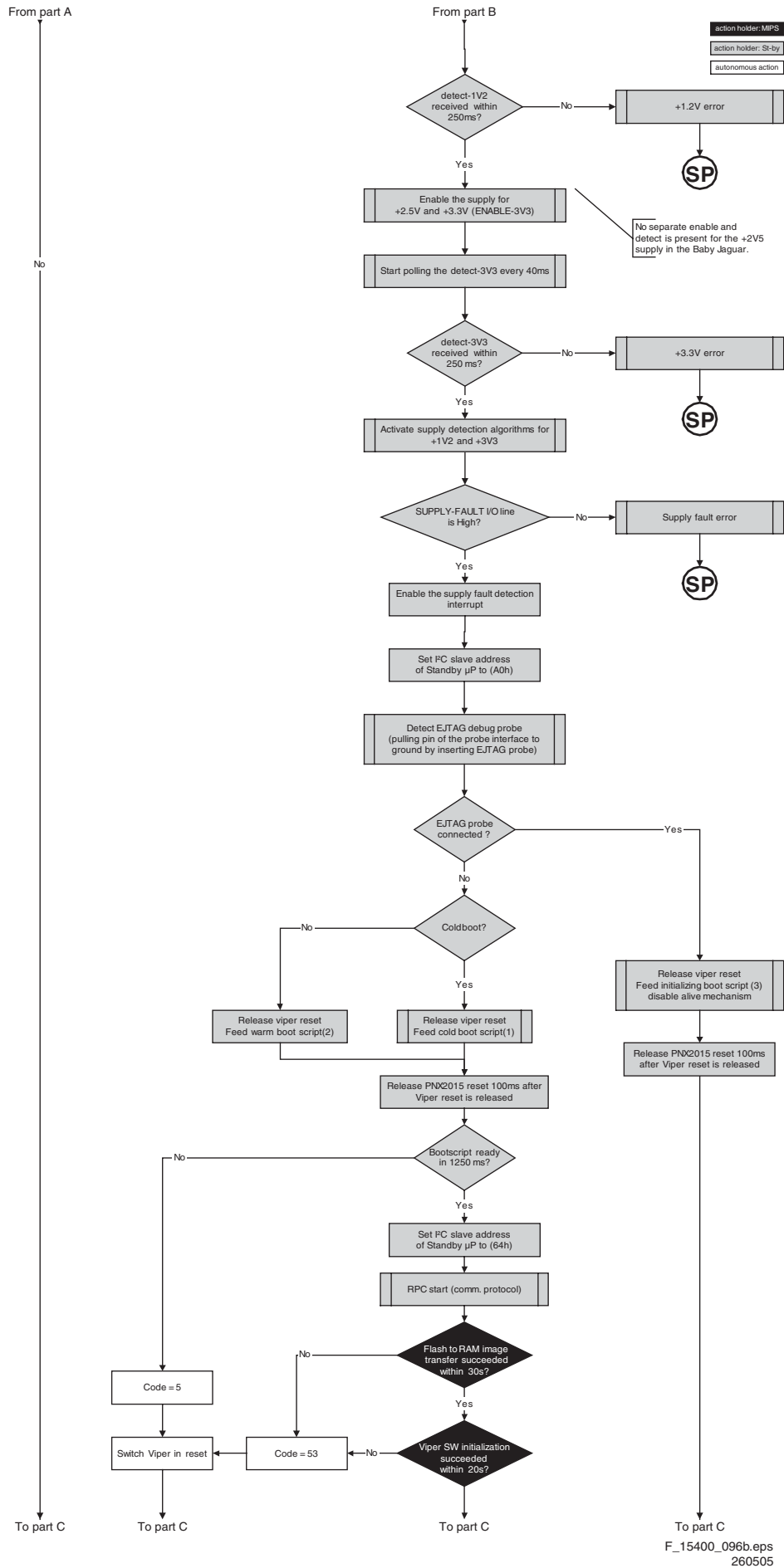
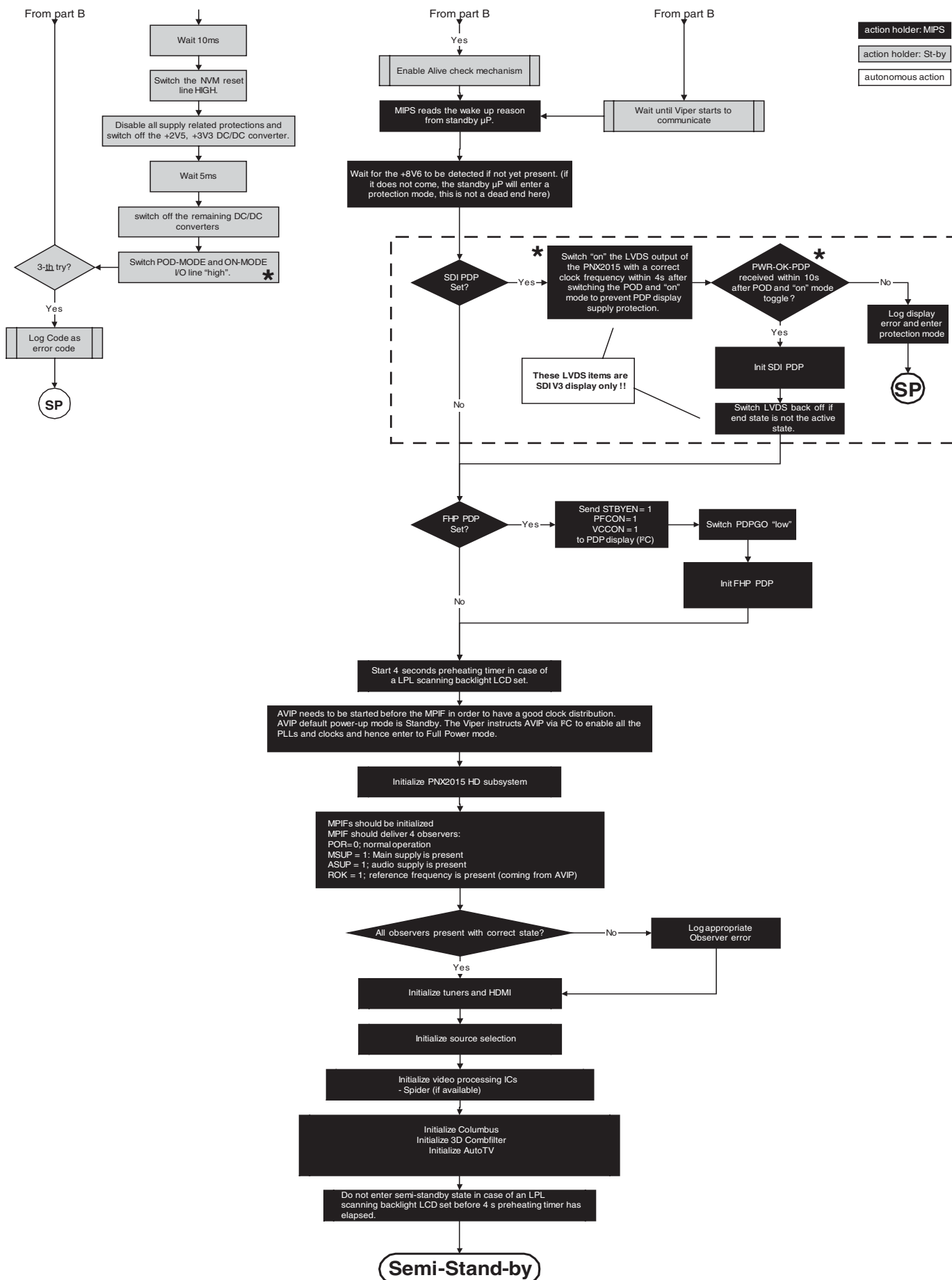


Figure 5-4 “Off” to “Semi Stand-by” flowchart (part 2)



* Only applicable for sets with CableCARD™ slot (POD)

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Figure 5-5 "Off" to "Semi Stand-by" flowchart (part 3)

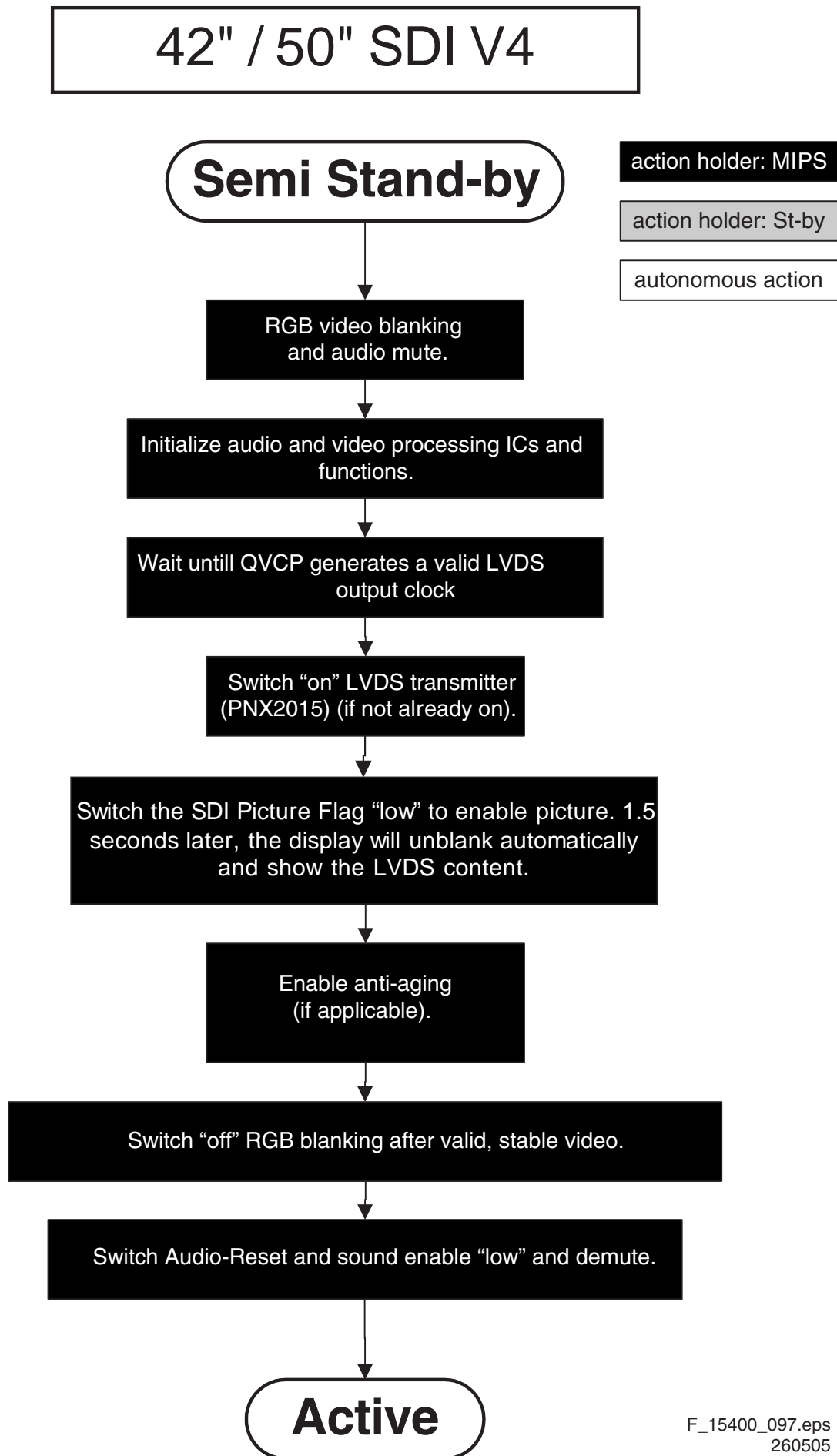


Figure 5-6 "Semi Stand-by" to "Active" flowchart

42" / 50" SDI V4

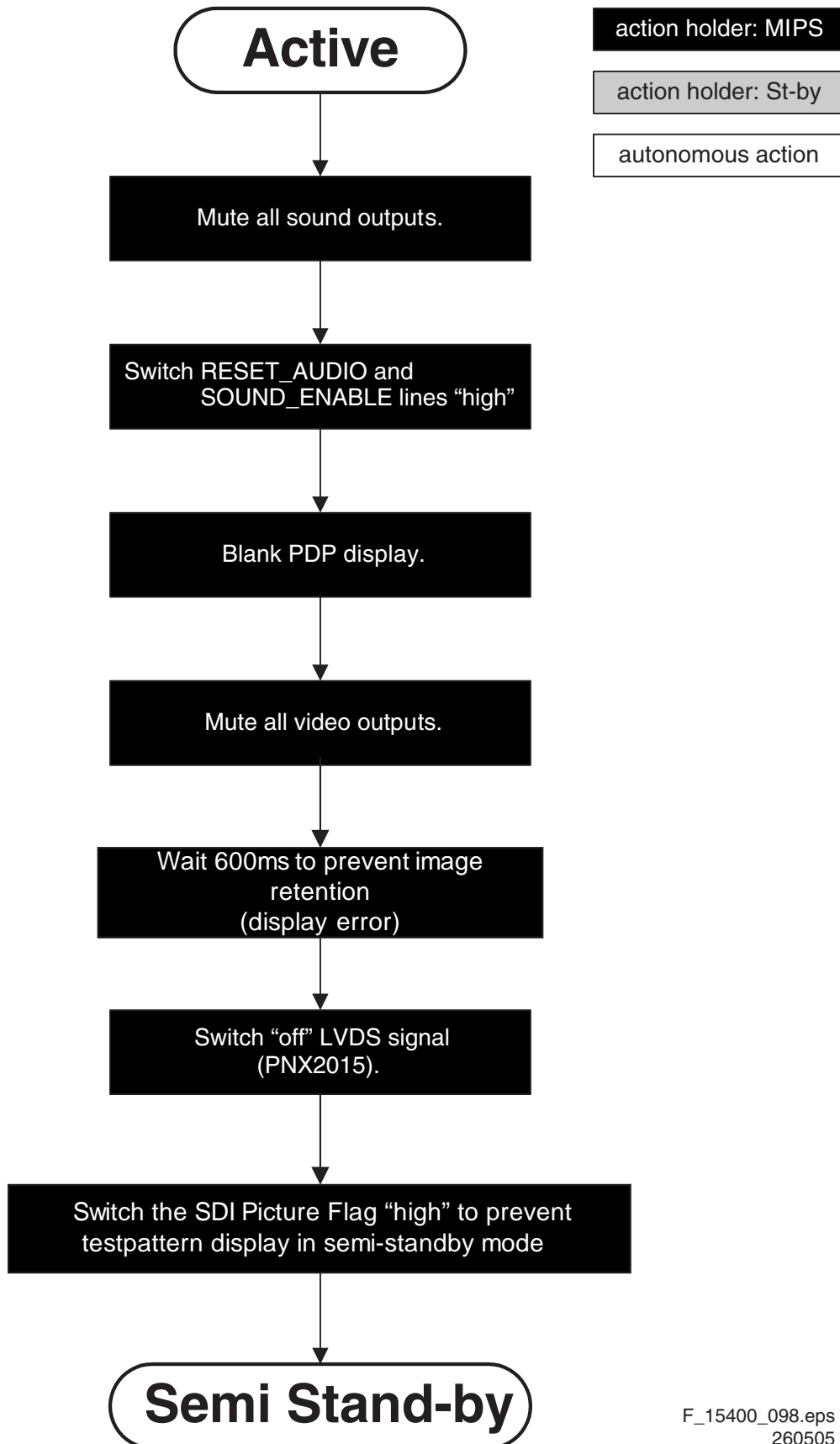
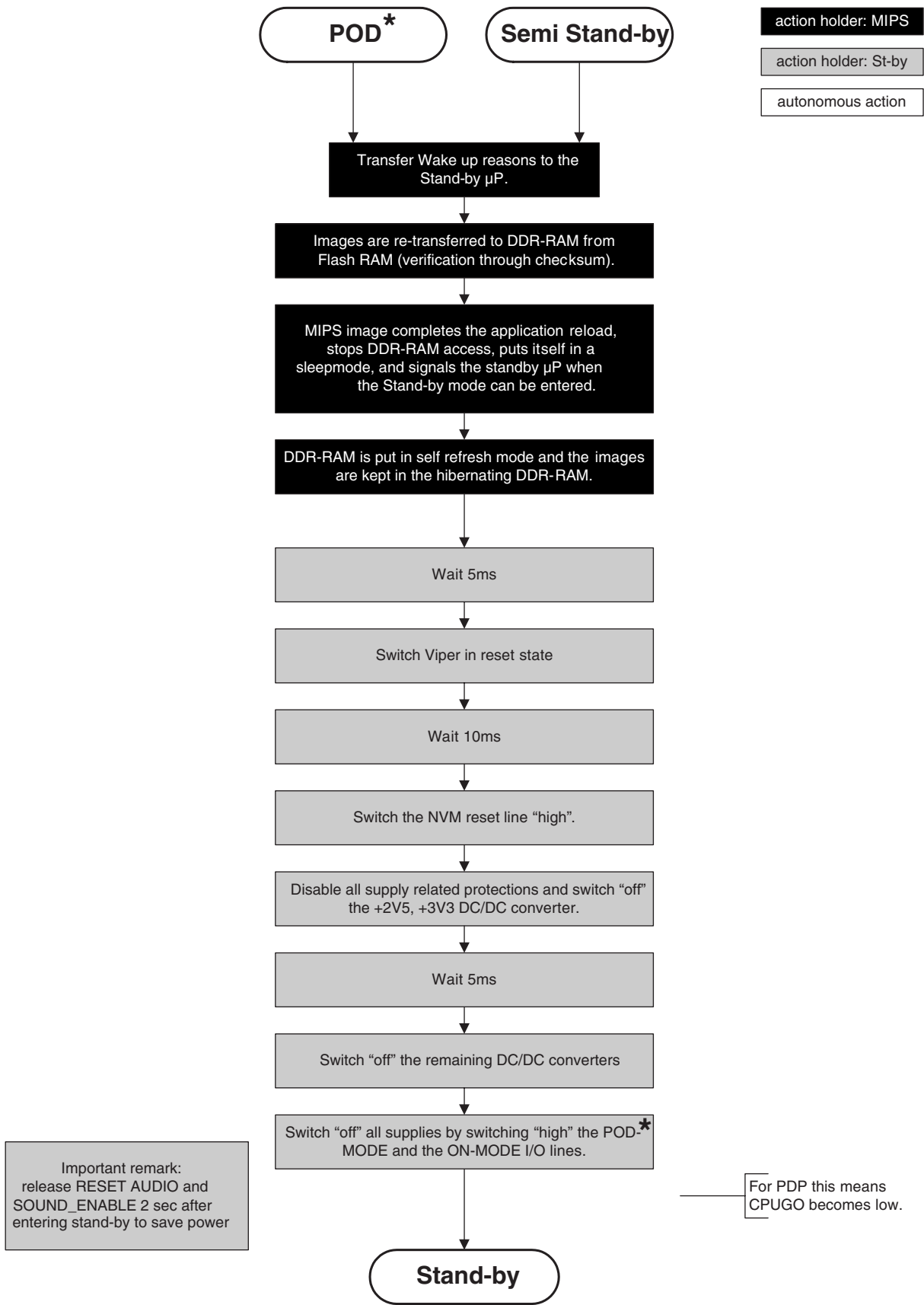
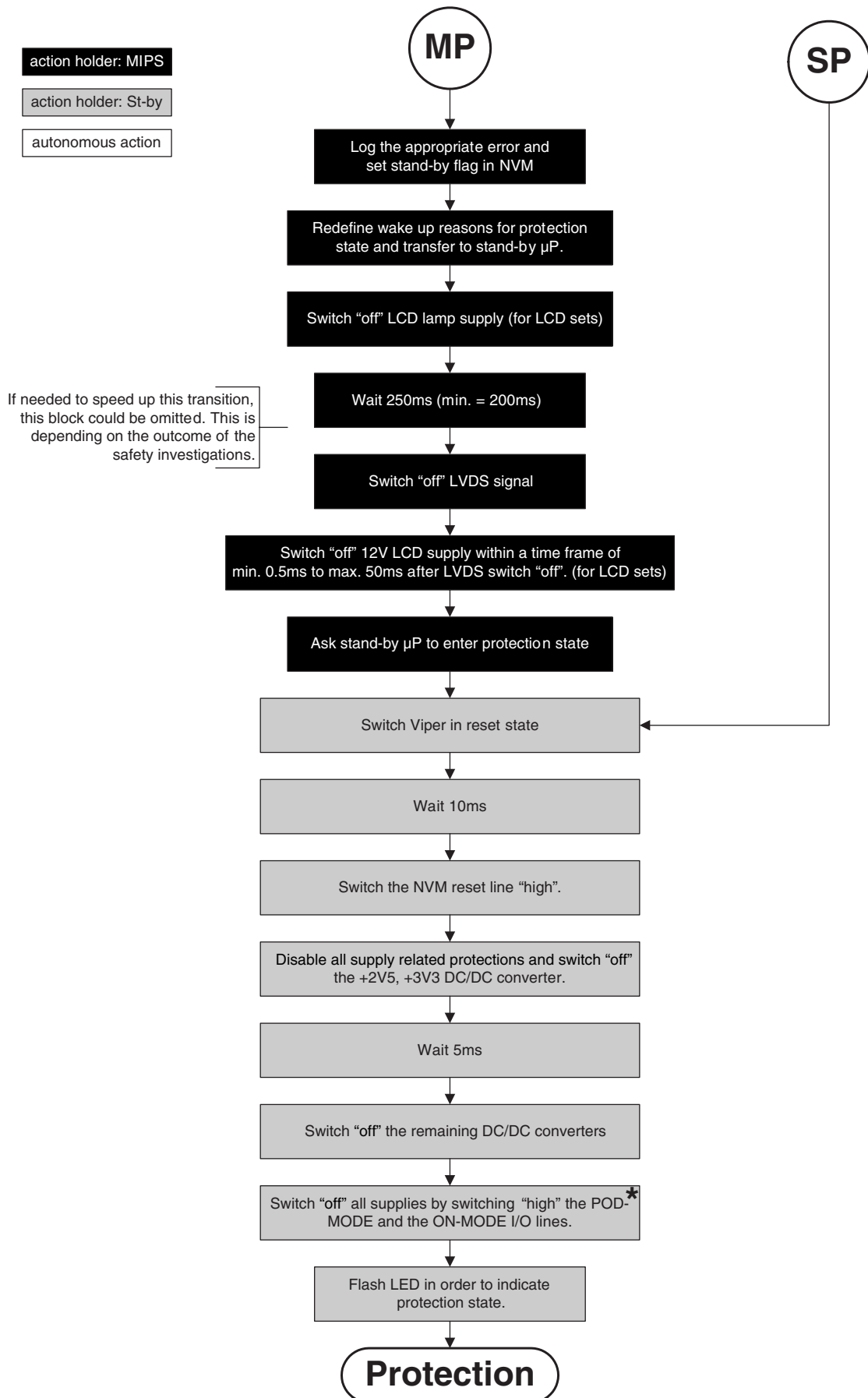


Figure 5-7 "Active" to "Semi Stand-by" flowchart



* Only applicable for sets with CableCARD™ slot (POD)

Figure 5-8 "Semi Stand-by" to "Stand-by" flowchart



* Only applicable for sets with CableCARD™ slot (POD)

F_15400_102.eps
020206

Figure 5-9 "Protection" flowchart

5.4 Service Tools

5.4.1 ComPair

Introduction

ComPair (Computer Aided Repair) is a service tool for Philips Consumer Electronics products. ComPair is a further development on the European DST (service remote control), which allows faster and more accurate diagnostics. ComPair has three big advantages:

1. ComPair helps you to quickly get an understanding on how to repair the chassis in a short time by guiding you systematically through the repair procedures.
2. ComPair allows very detailed diagnostics (on I²C level) and is therefore capable of accurately indicating problem areas. You do not have to know anything about I²C commands yourself because ComPair takes care of this.
3. ComPair speeds up the repair time since it can automatically communicate with the chassis (when the microprocessor is working) and all repair information is directly available. When ComPair is installed together with the Force/SearchMan electronic manual of the defective chassis, schematics and PWBs are only a mouse click away.

Specifications

ComPair consists of a Windows based fault finding program and an interface box between PC and the (defective) product. The ComPair interface box is connected to the PC via a serial (or RS-232) cable.

For this chassis, the ComPair interface box and the TV communicate via a bi-directional service cable via the service connector(s).

The ComPair fault finding program is able to determine the problem of the defective television. ComPair can gather diagnostic information in two ways:

- Automatically (by communicating with the television): ComPair can automatically read out the contents of the entire error buffer. Diagnosis is done on I²C/UART level. ComPair can access the I²C/UART bus of the television. ComPair can send and receive I²C/UART commands to the microcontroller of the television. In this way, it is possible for ComPair to communicate (read and write) to devices on the I²C/UART buses of the TV-set.
- Manually (by asking questions to you): Automatic diagnosis is only possible if the microcontroller of the television is working correctly and only to a certain extent. When this is not the case, ComPair will guide you through the fault finding tree by asking you questions (e.g. *Does the screen give a picture? Click on the correct answer: YES / NO*) and showing you examples (e.g. *Measure test-point 17 and click on the correct oscillogram you see on the oscilloscope*). You can answer by clicking on a link (e.g. *text or a waveform picture*) that will bring you to the next step in the fault finding process.

By a combination of automatic diagnostics and an interactive question / answer procedure, ComPair will enable you to find most problems in a fast and effective way.

How To Connect

This is described in the chassis fault finding database in ComPair.

Caution: It is compulsory to connect the TV to the PC as shown in the picture below (with the ComPair interface in between), as the ComPair interface acts as a level shifter. If one connects the TV directly to the PC (via UART), ICs will be blown!

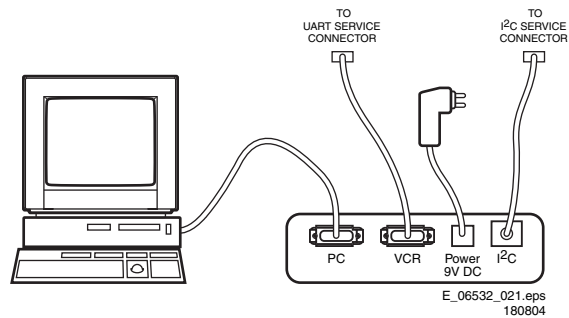


Figure 5-10 ComPair interface connection

How To Order

ComPair order codes:

- ComPair Software: ST4191.
- ComPair Interface Box: 4822 727 21631.
- AC Adapter: T405-ND.
- ComPair Quick Start Guide: ST4190.
- ComPair interface extension cable: 3139 131 03791.
- ComPair UART interface cable: 3122 785 90630.

Note: If you encounter any problems, contact your local support desk.

5.4.2 LVDS Tool

Introduction

This service tool (also called "ComPair Assistant 1") may help you to identify, in case the TV does not show any picture, whether the Small Signal Board (SSB) or the display of a Flat TV is defective.

Furthermore it is possible to program EPLDs with this tool (Byte blaster). Read the user manual for an explanation of this feature.

Since 2004, the LVDS output connectors in our Flat TV models are standardized (with some exceptions). With the two delivered LVDS interface cables (31p and 20p) you can cover most chassis (in special cases, an extra cable will be offered).

When operating, the tool will show a small (scaled) picture on a VGA monitor. Due to a limited memory capacity, it is not possible to increase the size when processing high-resolution LVDS signals (> 1280x960). Below this resolution, or when a DVI monitor is used, the displayed picture will be full size.

Generally this tool is intended to determine if the SSB is working or not. Thus to determine if LVDS, RGB, and sync signals are okay.

How to Connect

Connections are explained in the user manual, which is packed with the tool.

Note: To use the LVDS tool, you must have ComPair release 2004-1 (or later) on your PC (engine version >= 2.2.05). For every TV type number and screen size, one must choose the proper settings via ComPair. The ComPair file will be updated regularly with new introduced chassis information.

How to Order

- LVDS tool (incl. two LVDS cables: 31p and 20p): 3122 785 90671.
- LVDS tool Service Manual: 3122 785 00810.

5.5 Error Codes

5.5.1 Introduction

The error code buffer contains all detected errors since the last time the buffer was erased. The buffer is written from left to right, new errors are logged at the left side, and all other errors shift one position to the right.

When an error has occurred, the error is added to the list of errors, provided the list is not full or the error is a protection error.

When an error occurs and the error buffer is full, then the new error is not added, and the error buffer stays intact (history is maintained), except when the error is a protection error.

To prevent that an occasional error stays in the list forever, the error is removed from the list after 50+ operation hours.

When multiple errors occur (errors occurred within a short time span), there is a high probability that there is some relation between them.

Basically there are three kinds of errors:

- **Errors detected by the Stand-by Processor.** These errors will always lead to protection and an automatic start of the blinking LED for the concerned error (see paragraph "The Blinking LED Procedure"). In these cases SDM can be used to start up (see chapter "Stepwise Start-up").
- **Errors detected by VIPER that lead to protection.** In this case the TV will go to protection and the front LED will blink at 3 Hz. Further diagnosis via service modes is not possible here (see also paragraph "Error Codes" -> "Error Buffer" -> "Extra Info").
- **Errors detected by VIPER that do not lead to protection.** In this case the error can be read out via ComPair, via blinking LED method, or in case you have picture, via SAM.

5.5.2 How to Read the Error Buffer

Use one of the following methods:

- On screen via the SAM (only if you have a picture). E.g.:

- **00 00 00 00 00:** No errors detected
- **06 00 00 00 00:** Error code 6 is the last and only detected error
- **09 06 00 00 00:** Error code 6 was first detected and error code 9 is the last detected error
- Via the blinking LED procedure (when you have no picture). See next paragraph.
- Via ComPair.

5.5.3 How to Clear the Error Buffer

Use one of the following methods:

- By activation of the "RESET ERROR BUFFER" command in the SAM menu.
- With a normal RC, key in sequence "MUTE" followed by "062599" and "OK".
- If the content of the error buffer has not changed for 50+ hours, it resets automatically.

5.5.4 Error Buffer

In case of non-intermittent faults, clear the error buffer before you begin the repair (**before** clearing the buffer, write down the content, as this history can give you significant information). This to ensure that old error codes are no longer present.

If possible, check the entire contents of the error buffer. In some situations, an error code is only the result of another error code and not the actual cause (e.g., a fault in the protection detection circuitry can also lead to a protection).

There are several mechanisms of error detection:

- Via error bits in the status registers of ICs.
- Via polling on I/O pins going to the stand-by processor.
- Via sensing of analogue values on the stand-by processor.
- Via a "not acknowledge" of an I²C communication

Take notice that some errors need more than 90 seconds before they start blinking. So in case of problems wait 2 minutes from start-up onwards, and then check if the front LED is blinking.

Table 5-3 Error code overview

Error	Description	Error/Prot	Detected by	Device	Defective module	Result
1	I ² C1	P	VIPER	n.a.	I ² C1_blocked	Protection + 3 Hz blinking
2	I ² C2	P	VIPER	n.a.	I ² C2_blocked	Protection + 3 Hz blinking
3	I ² C3	P	Stby µP	n.a.	I ² C3_blocked	Protection + 3 Hz blinking
4	I ² C4	P	VIPER	n.a.	I ² C4_blocked	Protection + 3 Hz blinking
5	VIPER does not boot (hardware failure)	P	Stby µP	PNX8550		Protection + Error blinking
6	5V supply	P	Stby µP	n.a.		Protection + Error blinking
8	1.2V DC/DC	P	Stby µP	n.a.		Protection + Error blinking
11	3.3V DC/DC	P	Stby µP	n.a.		Protection + Error blinking
12	12V supply	P	Stby µP	n.a.		Protection + Error blinking
14	Supply Class D amplifiers	P	Stby µP			Protection + Error blinking
17	MPIF1 Audio Supply (ASUP)	E	VIPER	PNX3000	IF I/O	Error logged
18	MPIF1 ref freq	E	VIPER	PNX3000	IF I/O	Error logged
25	Supply fault	P	Stby µP			Protection + Error blinking
27	Phoenix	E	VIPER	PNX2015B	HD subsystem	Error logged
29	AVIP1	E	VIPER	PNX2015	AV input processor 1	Error logged
32	MPIF1	E	VIPER	KN10241C	Analog Front End 1	Error logged
34	Tuner1	E	VIPER		Tuner 1	Error logged
37	Channel decoder	E	VIPER	NXT2003		Error logged
43	Hi Rate Front End	E	VIPER	TDA8751	HDMI	Error logged
45	Columbus 1	E	VIPER	PNX2015	Comb filter	Error logged
53	VIPER does not boot (software failure)	P	Stby µP	PNX8550		Protection + Error blinking
63	PDP Display	P	VIPER		Display	Protection + 3 Hz blinking

Extra Info

- **Error 1 (I²C bus 1 blocked).** When this error occurs, the TV will go to protection and the front LED will blink at 3 Hz. Now you can partially restart the TV via the SDM shortcut pins on the SSB. Depending on the software version it is possible that no further diagnose (error code read-out) is possible. With the knowledge that only errors 1, 2, 4, and 63 result in a 3 Hz blinking LED, the range of possible defects is limited.
- **Error 2 (I²C bus 2 blocked).** When this error occurs, the TV will go to protection and the front LED will blink at 3 Hz. Now you can partially restart the TV via the SDM shortcut pins on the SSB. Due to hardware restriction (I²C bus 2 is the fast I²C bus) it will be impossible to start up the VIPER and therefore it is also impossible to read out the error codes via ComPair or via the blinking LED method. With the knowledge that only errors 1, 2, 4, and 63 result in a 3 Hz blinking LED, the range of possible defects is limited. When you have restarted the TV via the SDM shortcut pins, and then pressed "CH+" on your remote control, the TV will go to protection again, and the front LED blink at 3 Hz again. This could be an indication that the problem is related to error 2.
- **Error 3 (I²C bus 3 blocked).** There are only three devices on I²C bus 3: VIPER, Stand-by Processor, and NVM. The Stand-by Processor is the detection device of this error, so this error will only occur if the VIPER or the NVM is blocking the bus. This error will also be logged when the NVM gives no acknowledge on the I²C bus (see error 44). Note that if the 12 V supply is missing (connector 1M46 on the SSB), the DC/DC supply on the SSB will not work. Therefore the VIPER will not get supplies and could block I²C bus 3. So, a missing 12 V can also lead to an error 3.
- **Error 4 (I²C bus 4 blocked).** Same remark as with error 1.
- **Error 5 (I²C bus 5 blocked).** This error will point to a severe hardware problem around the VIPER (supplies not OK, VIPER completely dead, I²C link between VIPER and Stand-by Processor broken, etc...).
- **Error 7 (8.6 V error).** Except a physical problem with the 8.6 V itself, it is also possible that there is something wrong with the Audio DC Protection: see paragraph "Hardware Protections" for this.
- **Error 12 (12 V error).** Except a physical problem with the 12 V itself, it is also possible that there is something wrong with the Audio DC Protection: see paragraph "Hardware Protections" for this.
- **Error 14 (Audio supply).** This error is triggered in case of too low voltage of the audio supplies and therefore a drop of the audio supply voltage of below appr. 9 V per supply rail (or lower than 18 V rail to rail). Also a DC voltage of higher than 1 V DC on the speakers will lead to protection and error 14 blinking. For LCD sets this circuit can be found on schematic SA3, for PDP sets this can be found on schematic C. It should be noted that for 26-inch models there is only a supply link between the amplifiers and the stand-by μ C whereas in all other models this link is implemented by Audio-Prot line pin 7 on 1 M02.
- **Error 29 (AVIP1).** This error will probably generate extra errors. You will probably also see errors 32 (MPIF) and error 31 (AVIP 2). Error 29 and 31 will always be logged together due to the fact that both AVIPs are inside the PNX2015 and are on the same I²C bus. In this case start looking for the cause around AVIP (part of PNX2015).
- **Error 31 (AVIP2).** See info on error 29.
- **Error 34 (Tuner 1).** When this error is logged, it is not sure that there is something wrong with the tuner itself. It is also possible that there is something wrong with the communication between channel decoder and tuner. See schematic B2B.
- **Error 37 (Channel decoder).** This error will always log error 34 (tuner) extra. This is due to the fact that the tuner I²C bus is coming from the channel decoder.
- **Error 44 (NVM).** This error will never occur because it is masked by error 3 (I²C bus 3). The detection mechanism for error 3 checks on an I²C acknowledge of the NVM. If

NVM gives no acknowledge, the stand-by software assumes that the bus is blocked, the TV goes to protection and error 3 will be blinking.

- **Error 53.** This error will indicate that the VIPER has started to function (by reading his boot script, if this would have failed, error 5 would blink) but initialization was never completed because of hardware peripheral problems (NAND flash, ...) or software initialization problems. Possible cause could be that there is no valid software loaded (try to upgrade to the latest main software version).

5.6 The Blinking LED Procedure

5.6.1 Introduction

The blinking LED procedure can be split up into two situations:

- Blinking LED procedure in case of a protection detected by the stand-by processor. In this case the error is automatically blinked. This will be only one error, namely the one that is causing the protection. Therefore, you do not have to do anything special, just read out the blinks. A long blink indicates the decimal digit, a short blink indicates the units.
- Blinking LED procedure in the "on" state. Via this procedure, you can make the contents of the error buffer visible via the front LED. This is especially useful for fault finding, when there is no picture.

When the blinking LED procedure is activated in the "on" state, the front LED will show (blink) the contents of the error-buffer. Error-codes > 10 are shown as follows:

1. "n" long blinks (where "n" = 1 - 9) indicating decimal digit,
2. A pause of 1.5 s,
3. "n" short blinks (where "n" = 1 - 9),
4. A pause of approx. 3 s.
5. When all the error-codes are displayed, the sequence finishes with a LED blink of 3 s,
6. The sequence starts again.

Example: Error 12 9 6 0 0.

After activation of the SDM, the front LED will show:

1. 1 long blink of 750 ms (which is an indication of the decimal digit) followed by a pause of 1.5 s,
2. 2 short blinks of 250 ms followed by a pause of 3 s,
3. 9 short blinks followed by a pause of 3 s,
4. 6 short blinks followed by a pause of 3 s,
5. 1 long blink of 3 s to finish the sequence,
6. The sequence starts again.

5.6.2 How to Activate

Use one of the following methods:

- **Activate the SDM.** The blinking front LED will show the entire contents of the error buffer (this works in "normal operation" mode).
- **Transmit the commands "MUTE" - "062500" - "OK" with a normal RC.** The complete error buffer is shown. Take notice that it takes some seconds before the blinking LED starts.
- **Transmit the commands "MUTE" - "06250x" - "OK" with a normal RC** (where "x" is a number between 1 and 5). When x= 1 the last detected error is shown, x= 2 the second last error, etc.... Take notice that it takes some seconds before the blinking LED starts.

5.7 Protections

5.7.1 Software Protections

Most of the protections and errors use either the stand-by microprocessor or the VIPER controller as detection device. Since in these cases, checking of observers, polling of ADCs, filtering of input values are all heavily software based, these protections are referred to as software protections.

There are several types of software related protections, solving a variety of fault conditions:

- **Protections related to supplies:** check of the 12V, +5V, +8V6, +1.2V, +2.5V and +3.3V.
- **Protections related to breakdown of the safety check mechanism.** E.g. since a lot of protection detections are done by means of the VIPER, failing of the VIPER communication will have to initiate a protection mode since safety cannot be guaranteed anymore.

Remark on the Supply Errors

The detection of a supply dip or supply loss during the normal playing of the set does not lead to a protection, but to a cold reboot of the set.

Protections during Start-up

During TV start-up, some voltages and IC observers are actively monitored to be able to optimize the start-up speed, and to assure good operation of all components. If these monitors do not respond in a defined way, this indicates a malfunction of the system and leads to a protection. As the observers are only used during start-up, they are described in the start-up flow in detail (see paragraph "Stepwise Start-up").

5.7.2 Hardware Protections

There is one hardware protection in this chassis: "Audio DC Protection". This protection occurs when there is a DC voltage on the speakers. In that case the main supply is switched "off", but the stand-by supply is still working.

For the Samsung V4 PDP displays, the 8V6 supply is switched "off" and the LED on the display's Main Supply blinks eleven times, which means there is an overvoltage protection. The front LED of the TV will blink error 7 (8V6 error).

In case of LCD supplies, the 12V supply will drop. This will be detected by the stand-by processor, which will start blinking the 12 V error (error 12).

Repair Tip

- It is possible that you have an audio DC protection because of an interruption in one or both speakers (the DC voltage that is still on the circuit cannot disappear through the speakers).

5.8 Fault Finding and Repair Tips

Read also paragraph "Error Codes" - "Extra Info".

5.8.1 Exit "Factory Mode"

When an "F" is displayed in the screen's right corner, this means that the set is in "Factory" mode, and it normally happens after a new SSB has been mounted.

To exit this mode, push the "VOLUME minus" button on the TV's keyboard control for 5 seconds and restart the set

5.8.2 MPIF

Important things to make the MPIF work:

- Supply.
- Clock signal from the AVIP.
- I²C from the VIPER.

5.8.3 AVIP

Important things to make the AVIP work:

- Supplies.
- Clock signal from the VIPER.
- I²C from the VIPER (error 29 and 31).

5.8.4 DC/DC Converter

Introduction

- The best way to find a failure in the DC/DC converters is to check their starting-up sequence at power "on" via the Mains/AC Power cord, presuming that the Stand-by Processor is operational.
- If the input voltage of the DC/DC converters is around 12 V (measured on the decoupling capacitors 2U17/2U25/2U45) and the ENABLE signals are "low" (active), then the output voltages should have their normal values.
- First, the Stand-by Processor activates the +1V2 supply (via ENABLE-1V2).
- Then, after this voltage becomes present and is detected OK (about 100 ms), the other two voltages (+2V5 and +3V3) will be activated (via ENABLE-3V3).
- The current consumption of controller IC 7U00 is around 20 mA (that means around 200 mV drop voltage across resistor 3U22).
- The current capability of DC/DC converters is quite high (short-circuit current is 7 to 10 A), therefore if there is a linear integrated stabilizer that, for example delivers 1.8V from +3V3 with its output overloaded, the +3V3 stays usually at its normal value even though the consumption from +3V3 increases significantly.
- The +2V5 supply voltage is obtained via a linear stabilizer made with discrete components that can deliver a lot of current. Therefore, in case +2V5 (or +2V5D) is short-circuited to GND, the +3V3 will not have the normal value but much less.
- The supply voltage +12VSW is protected for over-currents by fuse 1U04.

Fault Finding

- **Symptom:** +1V2, +2V5, and +3V3 not present (even for a short while ~10ms).
 1. Check 12V availability (fuse 1U01, resistor 3U22, power MOS-FETs) and enable signal ENABLE-1V2 (active low).
 2. Check the voltage on pin 9 (1.5 V).
 3. Check for +1V2 output voltage short-circuit to GND that can generate pulsed over-currents 7-10 A through coil 5U03.
 4. Check the over-current detection circuit (2U12 or 3U97 interrupted).

- **Symptom:** +1V2 present for about 100 ms. Supplies +2V5 and +3V3 not rising.
 1. Check the ENABLE-3V3 signal (active "low").
 2. Check the voltage on pin 8 (1.5 V).
 3. Check the under-voltage detection circuit (the voltage on collector of transistor 7U10-1 should be less than 0.8 V).
 4. Check for output voltages short-circuits to GND (+3V3, +2V5 and +2V5D) that generate pulsed over-currents of 7-10 A through coil 5U00.
 5. Check the over-current detection circuit (2U18 or 3U83 interrupted).
- **Symptom:** +1V2 OK, but +2V5 and +3V3 present for about 100 ms. **Cause:** The SUPPLY-FAULT line stays "low" even though the +3V3 and +1V2 is available. The Stand-by Processor is detecting that and switches all supply voltages "off".
 1. Check the drop voltage across resistor 3U22 (this could be too high)
 2. Check if the +1V2 or +3V3 are higher than their normal values. This can be due to defective DC feedback of the respective DC/DC converter (3U18 or 3UA7).
- **Symptom:** +1V2, +2V5, and +3V3 look okay, except the ripple voltage is increased (audible noise can come from the filtering coils 5U00 or 5U03).
Cause: Instability of the frequency and/or duty cycle of one or both DC/DC converters.
 - Check resistor 3U06, the decoupling capacitors, the AC feedback circuits (2U20 + 2U21 + 3U14 + 3U15 for +1V2 or 2U19 + 2U85 + 3U12 + 3U13 for +3V3), the compensation capacitors 2U09, 2U10, 2U23 and 2U73, and IC 7U00.

Note 1: If fuse 1U01 is broken, this usually means a pair of defective power MOSFETs (7U01 or 7U03). Item 7U00 should be replaced as well in this case.

5.9 Software Upgrading

5.9.1 Introduction

The set software and security keys are stored in a NAND-Flash (item 7P80), which is connected to the VIPER via the PCI bus.

It is possible **for the user** to upgrade the **main** software via the USB port. This allows replacement of a software image in a standalone set, without the need of an E-JTAG debugger. A description on how to upgrade the main software can be found in chapter 3 "Directions For Use".

Important: When the NAND-Flash must be replaced, a new SSB must be ordered, due to the presence of the security keys!!! See table "SSB service kits" for the order codes. Perform the following actions after SSB replacement:

1. Set the correct option codes (see sticker inside the TV).
2. Update the TV software (see chapter 3 for instructions).
3. Perform the alignments as described in chapter 8.
4. Check in CSM menu 5 if the HDMI and POD keys are valid.

Table 5-4 SSB service kits (for EL and EP chassis)

Model Number	New SSB order code
26PF5321D/37	3139 267 27681
32PF5321D/37	3139 267 27711
32PF7321D/37	3139 267 27731
37PF7321D/37	3139 267 27691
42PF5421D/37	3139 267 27671
42PF7321D/37	3139 267 27661
42PF7421D/37	3139 267 27721
50PF7321D/37	3139 267 27701

5.9.2 Main Software Upgrade

The software image resides in the NAND-Flash, and is formatted in the following way:

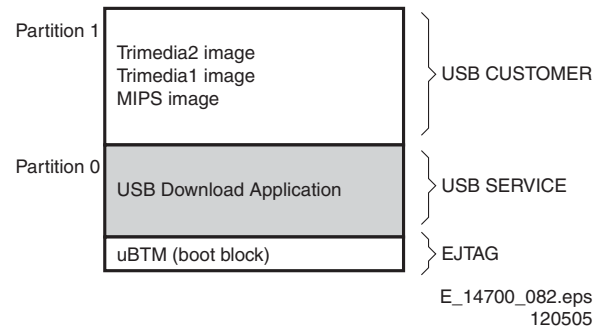


Figure 5-11 NAND-Flash format

Executables are stored as files in a file system. The boot loader (uBTM) will load the USB Download Application in partition 0 (USB drivers, bootscript, etc). This application makes it then possible to upgrade the main software via USB.

Installing "Partition 0" software is possible via an external EJTAG tool, but also in a special way with the USB stick (see description in paragraph "Partition 0").

Partition 1 (Customer)

To do a main software upgrade (partition 1) via USB, the set must be operational, and the "Partition 0" files for the VIPER **must** be installed in the NAND-Flash!

The new software can be uploaded to the TV by using a portable memory device or USB storage compliant devices (e.g. USB memory stick). You can download the new software from the Philips website to your PC.

Partition 0 (Service)

If the "Partition 0" software is corrupted, the software needs to be re-installed.

To upgrade this "USB download application" (partition 0 except the bootblock), insert an USB stick with the correct software, but press the "red" button on the remote control (in "TV" mode) when it is asked via the on screen text.

Caution:

- The USB download application will now erase **both** partitions (except the boot block), so you need to reload the main SW after upgrading the USB download application. As long as this is not done, the USB download application will start when the set is switched "on".
- When something goes wrong during the progress of this method (e.g. voltage dip or corrupted software file), the set will not start up, and can only be recovered via the EJTAG tool!

5.9.3 Manual Start of the Main Software Upgrade Application

Normally, the software upgrading procedure will start automatically, when a memory device with the correct software is inserted, but in case this does not work, it is possible to force the TV into the software upgrade application. To do so:

- Disconnect the TV from the Mains/AC Power.
- Press the "OK" button on a Philips DVD RC-6 remote control (it is also possible to use the TV remote in "DVD" mode).
- Keep the "OK" button pressed while connecting the TV to the Mains/AC Power.
- The software upgrade application will start.
- When a memory device with upgrade software is connected, the upgrade process will start.

5.9.4 Stand-by Software Upgrade

It will be possible to upgrade the Stand-by software via a PC and the ComPair interface. Check paragraph "ComPair" on how to connect the interface. To upgrade the Stand-by software, use the following steps:

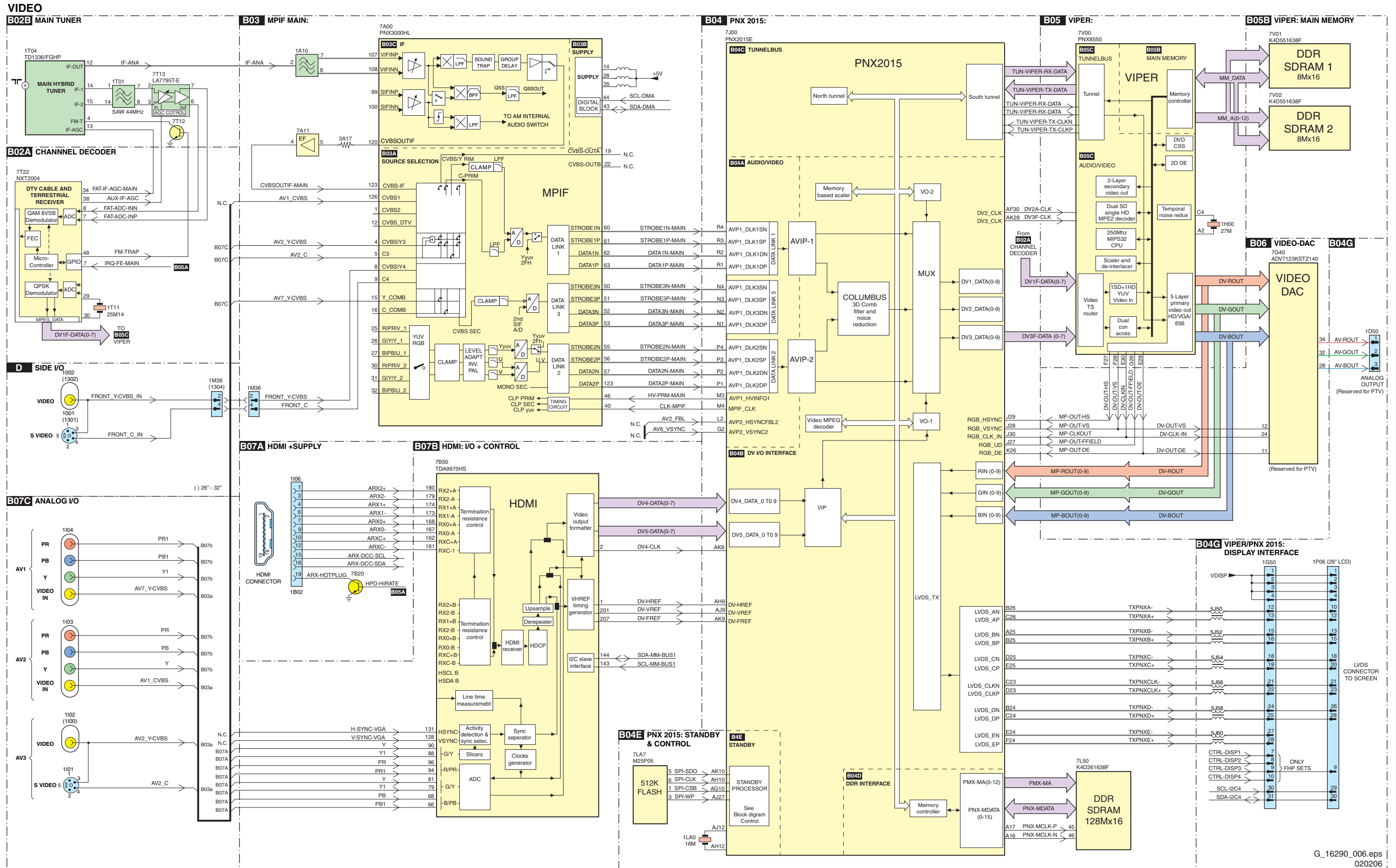
1. Disconnect the TV from the Mains/AC Power.
2. Short circuit the SPI pins [2] on the SSB. They are located outside the shielding (see figure "SDM and SPI service pads" earlier in this chapter).
3. Keep the SPI pins shorted while connecting the TV to the Mains/AC Power.
4. Release the short circuit after approx. two seconds.
5. Start up HyperTerminal (can be found in every Windows application via Programs -> Accessories -> Communications -> HyperTerminal. Use the following settings:
 - COM1
 - Bits per second = 38400
 - Data bits = 8
 - Parity = none
 - Stop bits = 1
 - Flow control = Xon / Xoff.
6. Press "Shift U" on your PC keyboard. You should now see the following info:
 - PNX2015 Loader V1.0
 - 19-09-2003
 - DEVID=0x05
 - Erasing
 - MCSUM=0x0000
 - =
7. If you do not see the above info, restart the above procedure, and check your HyperTerminal settings and the connections between PC and TV.
8. Via "Transfer" -> "Send text file ...", you can send the proper upgrade file to the TV. This file will be distributed via the Service Organization.
9. After successful programming, you must see the following info:
 - DCSUM=0xECB3
 - :Ok
 - MCSUM=0xECB3
 - Programming
 - PCSUM=0xECB3
 - Finished
10. If you do not see this info, restart the complete procedure.
11. Close HyperTerminal.
12. Disconnect and connect Mains/AC Power again.

Personal Notes:

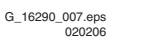
Wiring Diagram 42" & 50"

[illegible]

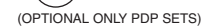
Block Diagram Video



AUDIO

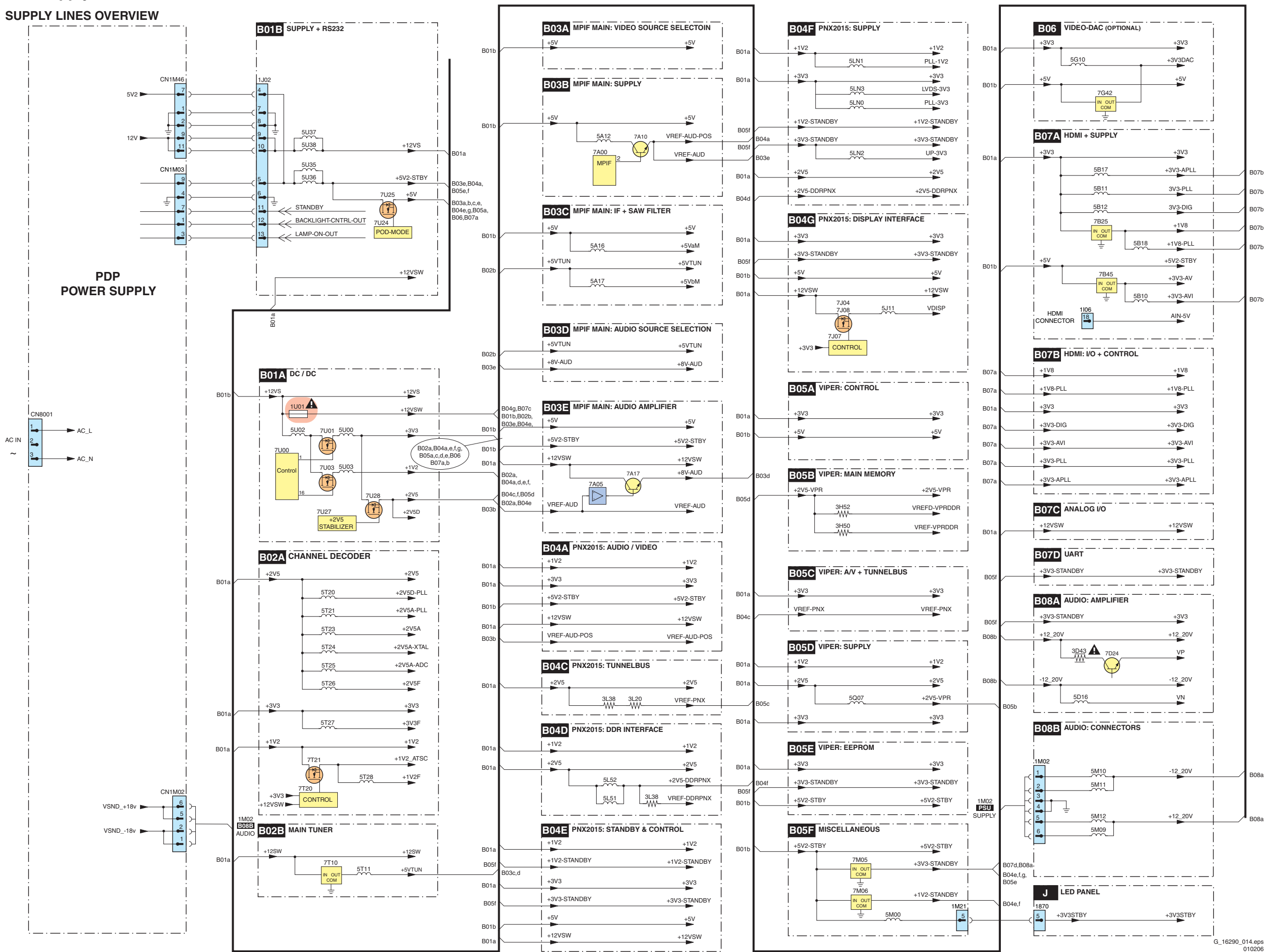


I²C



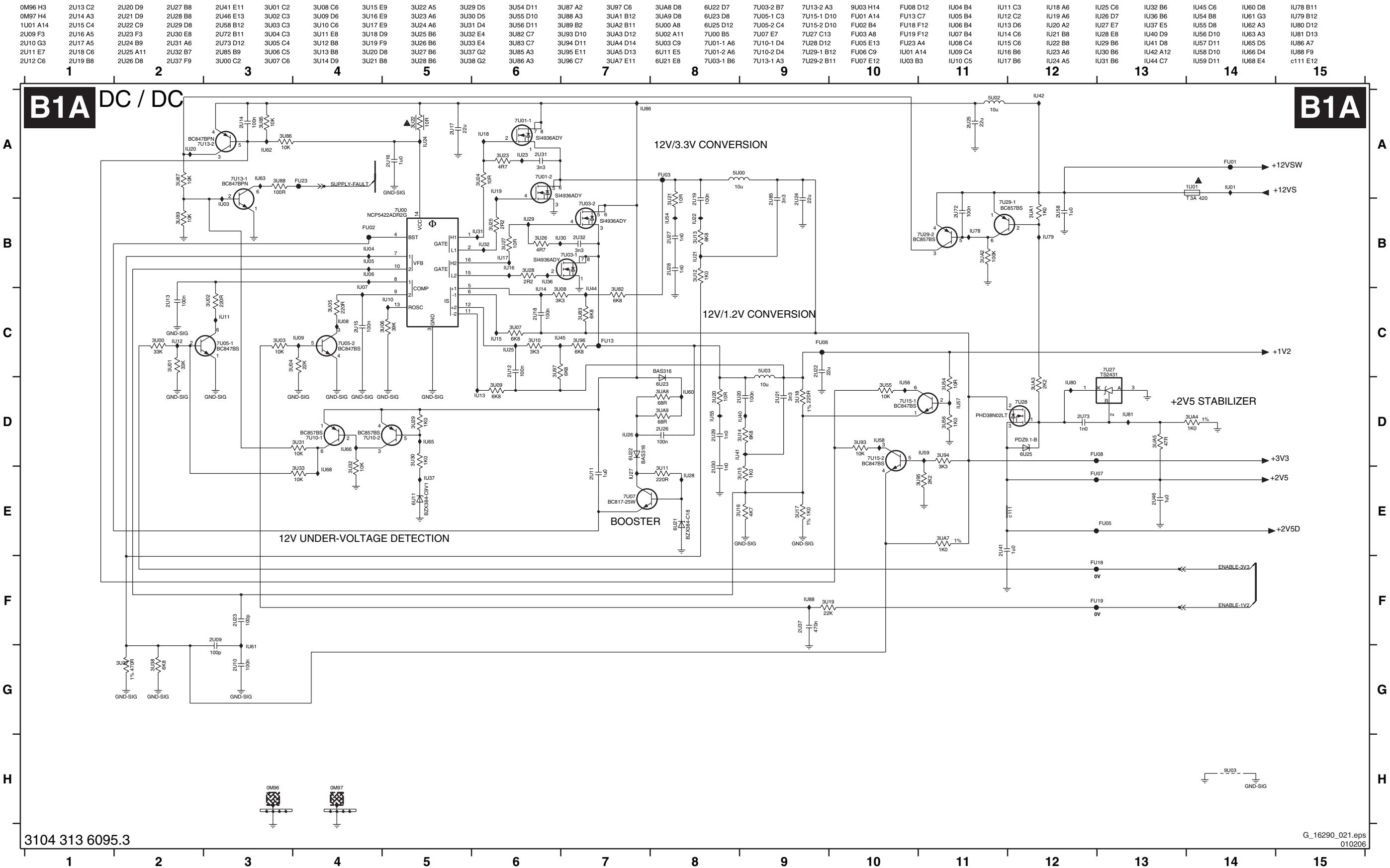
Supply Lines Overview

SUPPLY LINES OVERVIEW



7. Circuit Diagrams and PWB Layouts

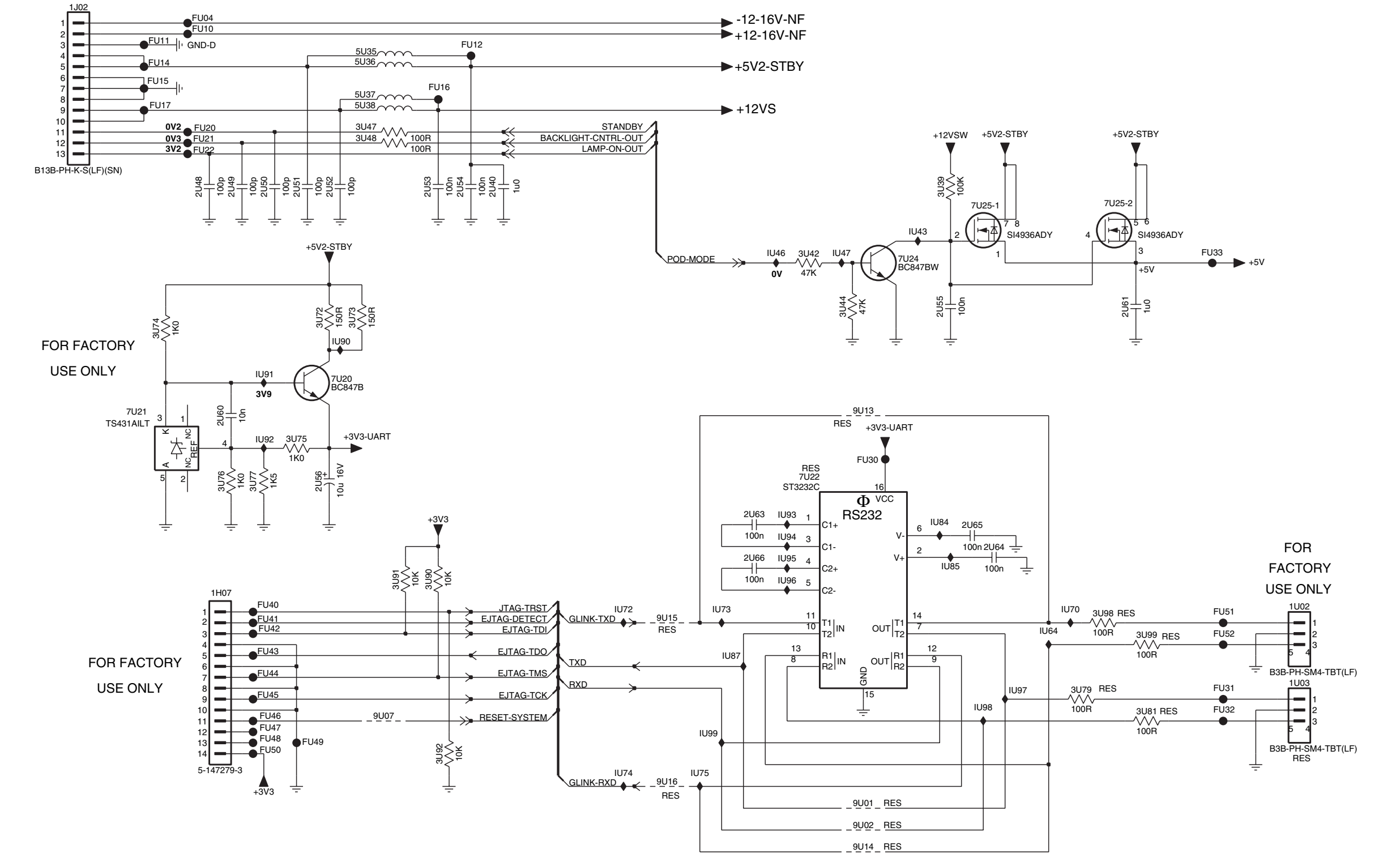
SSB: DC / DC



SSB: Supply + RS232

B1B SUPPLY + RS232

B1B



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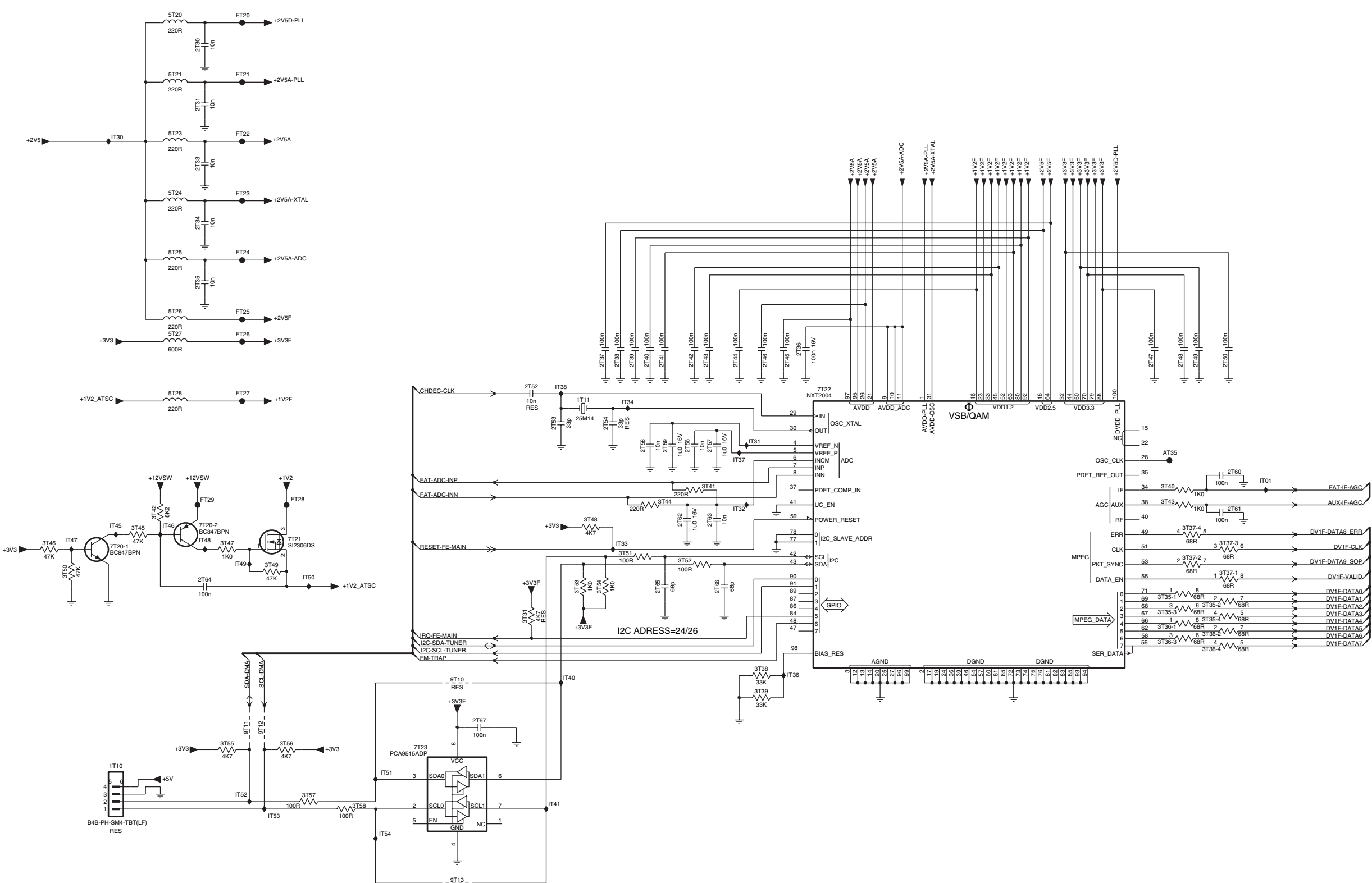
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- | | |
|-----------|---------|
| 1H07 E2 | FU46 E2 |
| 1J02 A1 | FU47 F2 |
| 1U02 E9 | FU48 F2 |
| 1U03 E9 | FU49 F2 |
| 2U40 B4 | FU50 F2 |
| 2U48 B2 | FU51 E8 |
| 2U49 B2 | FU52 E8 |
| 2U50 B2 | IU43 B6 |
| 2U51 B2 | IU46 B5 |
| 2U52 B3 | IU47 B6 |
| 2U53 B3 | IU64 E7 |
| 2U54 B3 | IU70 E7 |
| 2U55 C7 | IU72 E4 |
| 2U56 D2 | IU73 E5 |
| 2U60 D2 | IU74 F4 |
| 2U61 C8 | IU75 F5 |
| 2U63 D5 | IU84 D7 |
| 2U64 D7 | IU85 D7 |
| 2U65 D7 | IU87 E5 |
| 2U66 D5 | IU90 C3 |
| 3U39 B7 | IU91 C2 |
| 3U42 B6 | IU92 D2 |
| 3U44 C6 | IU93 D6 |
| 3U47 B3 | IU94 D6 |
| 3U48 B3 | IU95 D6 |
| 3U72 C3 | IU96 E6 |
| 3U73 C3 | IU97 E7 |
| 3U74 C1 | IU98 E7 |
| 3U75 D2 | IU99 F5 |
| 3U76 D2 | |
| 3U77 D2 | |
| 3U79 E7 | |
| 3U81 E8 | |
| 3U90 E3 | |
| 3U91 E3 | |
| 3U92 F3 | |
| 3U98 E8 | |
| 3U99 E8 | |
| 5U35 A3 | |
| 5U36 A3 | |
| 5U37 A3 | |
| 5U38 A3 | |
| 7U20 C3 | |
| 7U21 D1 | |
| 7U22 D6 | |
| 7U24 C6 | |
| 7U25-1 B7 | |
| 7U25-2 B8 | |
| 9U01 F6 | |
| 9U02 F6 | |
| 9U07 E3 | |
| 9U13 C6 | |
| 9U14 F6 | |
| 9U15 E5 | |
| 9U16 F5 | |
| FU04 A2 | |
| FU10 A2 | |
| FU11 A1 | |
| FU12 A3 | |
| FU14 A1 | |
| FU15 A1 | |
| FU16 A3 | |
| FU17 A1 | |
| FU20 B2 | |
| FU21 B2 | |
| FU22 B2 | |
| FU30 D6 | |
| FU31 E8 | |
| FU32 E8 | |
| FU33 B8 | |
| FU40 E2 | |
| FU41 E2 | |
| FU42 E2 | |
| FU43 E2 | |
| FU44 E2 | |
| FU45 E2 | |

SSB: Chaneel Decoder

B2A CHANNEL DECODER

B2A



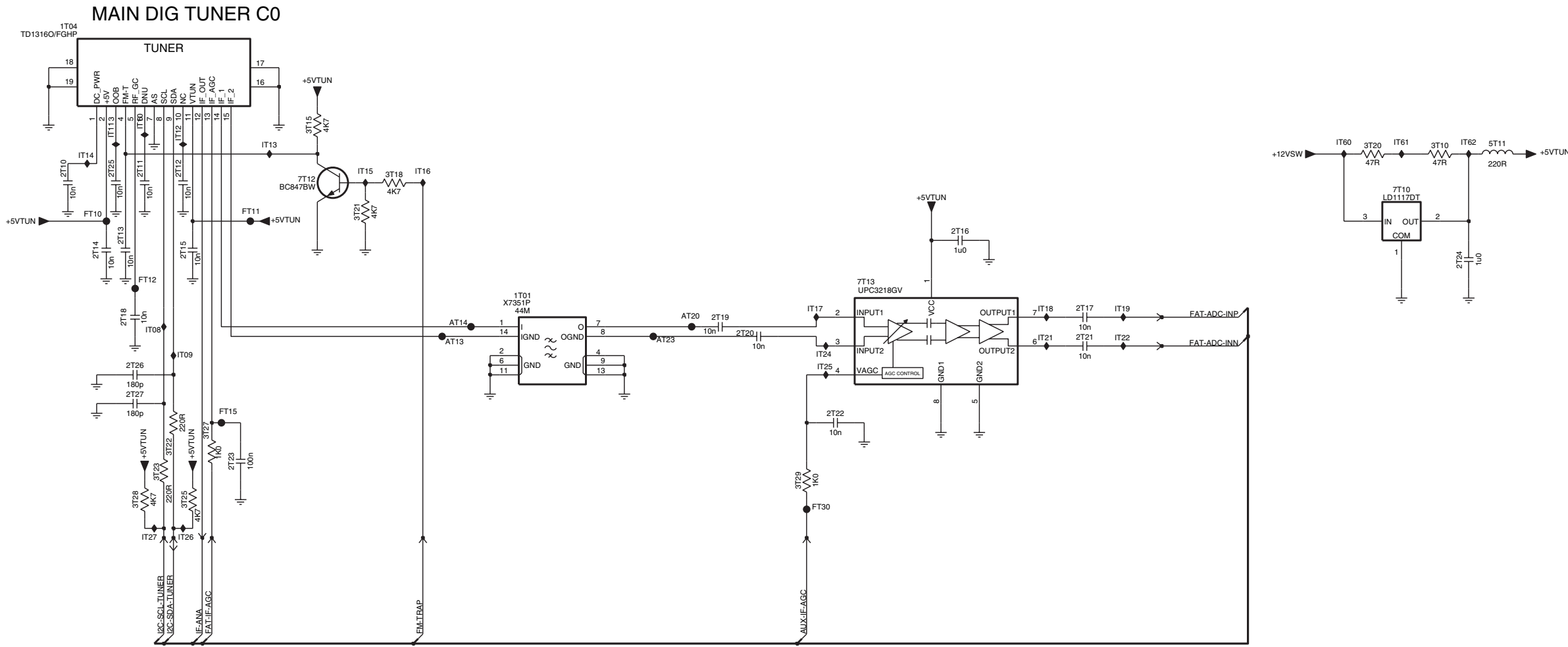
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SSB: Main Tuner

B2B MAIN TUNER

B2B

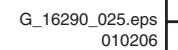


- 1T01 D5
- 1T04 B1
- 2T10 C1
- 2T11 C2
- 2T12 C2
- 2T13 C2
- 2T14 D2
- 2T15 D2
- 2T16 C8
- 2T17 D9
- 2T18 D2
- 2T19 D6
- 2T20 D6
- 2T21 D9
- 2T22 E7
- 2T23 E3
- 2T24 D12
- 2T25 C2
- 2T26 D2
- 2T27 E2
- 3T10 C12
- 3T15 C3
- 3T18 C4
- 3T20 C11
- 3T21 C4
- 3T22 E2
- 3T23 E2
- 3T25 E2
- 3T27 E2
- 3T28 E2
- 3T29 E7
- 5T11 C12
- 7T10 C11
- 7T12 C3
- 7T13 D7
- AT13 D4
- AT14 D4
- AT20 D6
- AT23 D6
- FT10 C2
- FT11 C3
- FT12 D2
- FT15 E3
- FT30 E7
- IT08 D2
- IT09 D2
- IT10 C2
- IT11 C2
- IT12 C2
- IT13 C3
- IT14 C1
- IT15 C4
- IT16 C4
- IT17 D7
- IT18 D9
- IT19 D9
- IT21 D9
- IT22 D9
- IT24 D7
- IT25 D7
- IT26 F2
- IT27 F2
- IT60 C11
- IT61 C11
- IT62 C12

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B3A



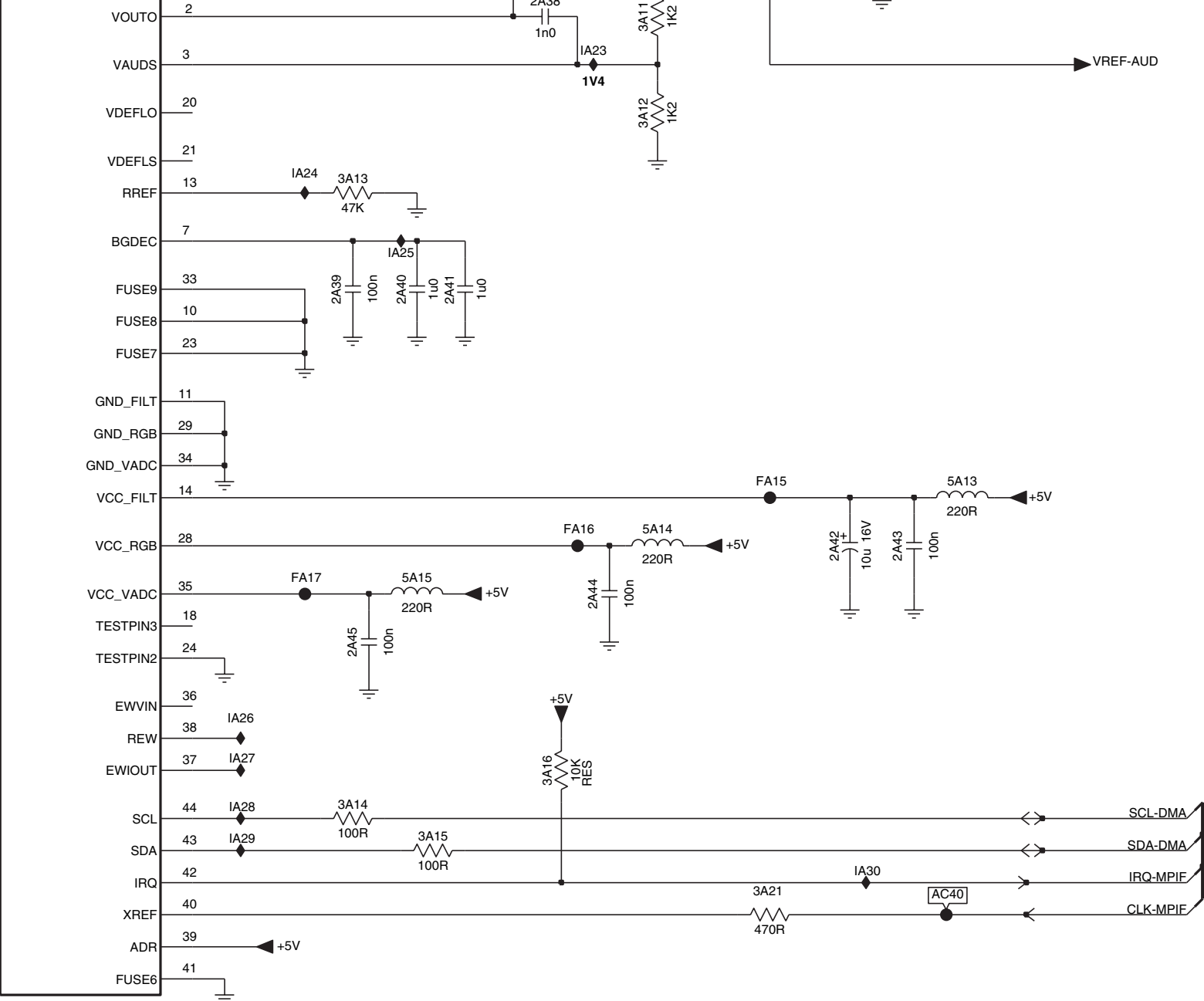
SSB: MPIF Main: Supply

B3B MPIF MAIN: SUPPLY

B3B

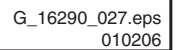
7A00-3
PNX3000HL/N2

MPIF-SUPPLY
E/W & CONTROL

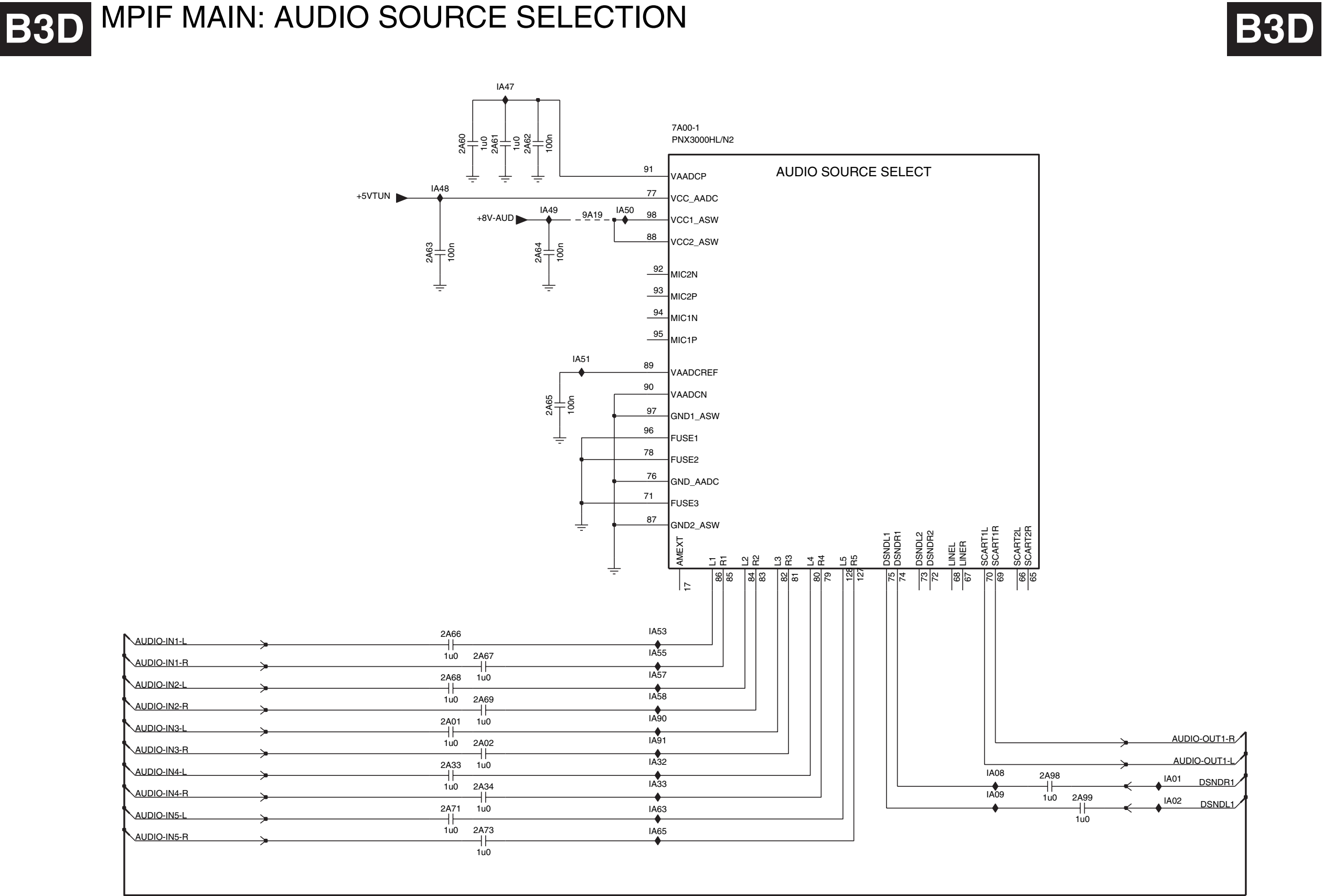


- 2A35 A6
- 2A37 B6
- 2A38 B5
- 2A39 C4
- 2A40 C4
- 2A41 C4
- 2A42 D6
- 2A43 D6
- 2A44 E5
- 2A45 E4
- 3A10 B5
- 3A11 B5
- 3A12 B5
- 3A13 C4
- 3A14 F4
- 3A15 F4
- 3A16 E5
- 3A21 F6
- 5A12 A6
- 5A13 D7
- 5A14 D5
- 5A15 E4
- 7A00-3 B2
- 7A10 A5
- 9A10 A6
- AC40 F6
- FA13 A6
- FA14 A7
- FA15 D6
- FA16 D5
- FA17 E4
- IA20 A5
- IA21 A6
- IA22 B5
- IA23 B5
- IA24 C4
- IA25 C4
- IA26 E3
- IA27 E3
- IA28 F3
- IA29 F3
- IA30 F6

B3C MPIF MAIN: IF + SAW FILTER



SSB: MPIF Main: Audio Source Selection



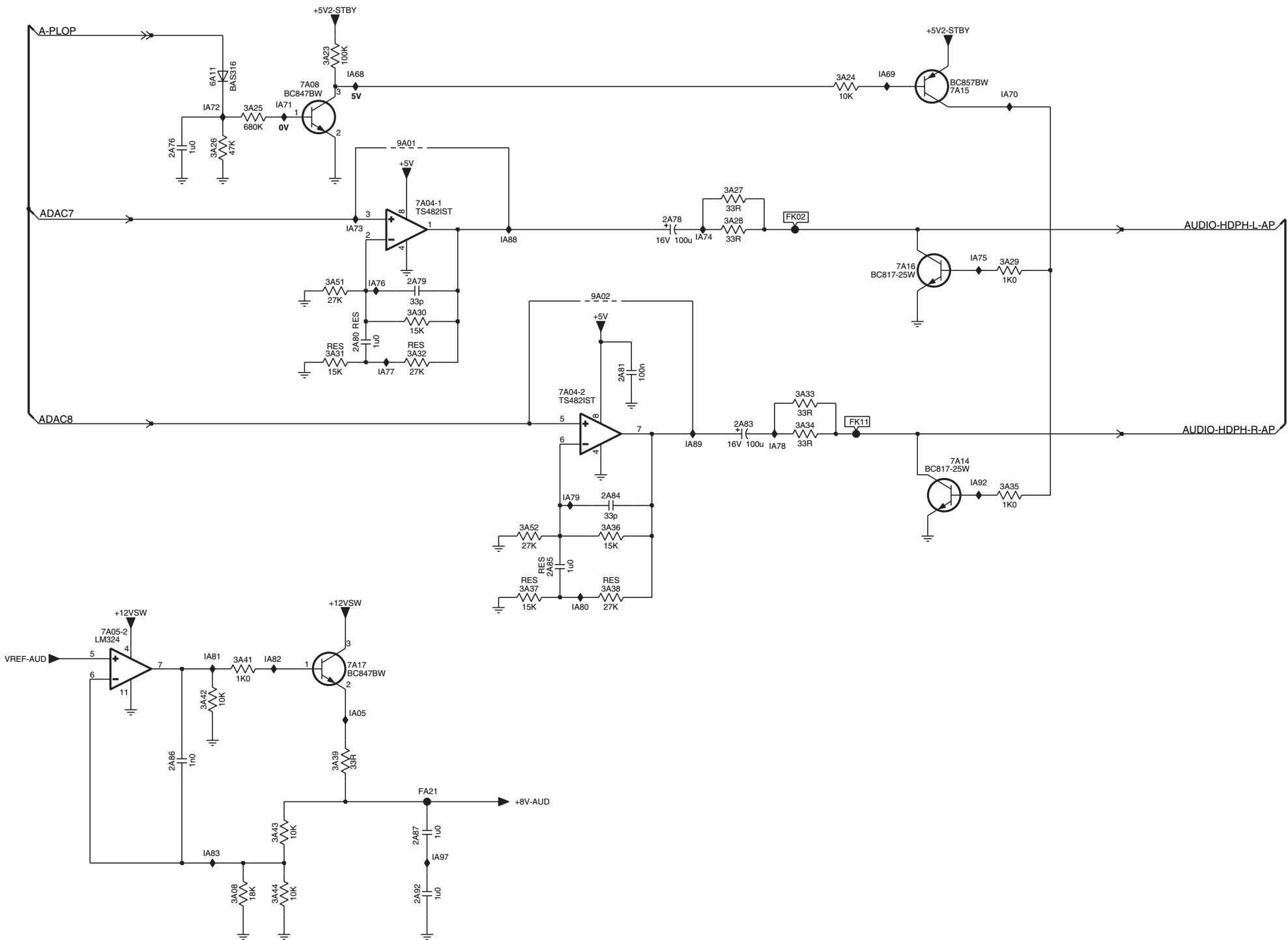
- 2A01 E3
- 2A02 E3
- 2A33 E3
- 2A34 F3
- 2A60 A3
- 2A61 A3
- 2A62 A4
- 2A63 B3
- 2A64 B4
- 2A65 C4
- 2A66 E3
- 2A67 E3
- 2A68 E3
- 2A69 E3
- 2A71 F3
- 2A73 F3
- 2A98 F7
- 2A99 F7
- 7A00-1 A5
- 9A19 B4
- IA01 F8
- IA02 F8
- IA08 E7
- IA09 F7
- IA32 E4
- IA33 F4
- IA47 A3
- IA48 B3
- IA49 B4
- IA50 B4
- IA51 C4
- IA53 E4
- IA55 E4
- IA57 E4
- IA58 E4
- IA63 F4
- IA65 F4
- IA90 E4
- IA91 E4

SSB: MPIF Main: Audio Amplifier

B3E

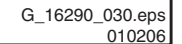
MPIF MAIN: AUDIO AMPLIFIER

B3E



- 2A76 B2
- 2A78 C5
- 2A79 C4
- 2A80 C3
- 2A81 D5
- 2A83 D6
- 2A84 E5
- 2A85 E5
- 2A86 F2
- 2A87 G4
- 2A92 G4
- 3A08 G2
- 3A23 A3
- 3A24 B7
- 3A25 B3
- 3A26 B2
- 3A27 B6
- 3A28 C6
- 3A29 C8
- 3A30 C4
- 3A31 D3
- 3A32 D4
- 3A33 D6
- 3A34 D6
- 3A35 D8
- 3A36 E5
- 3A37 E4
- 3A38 E5
- 3A39 F3
- 3A41 F2
- 3A42 F2
- 3A43 G3
- 3A44 G3
- 3A51 C3
- 3A52 E4
- 6A11 B2
- 7A04-1 C4
- 7A04-2 D5
- 7A05-2 E1
- 7A08 B3
- 7A14 D8
- 7A15 B7
- 7A16 C7
- 7A17 F3
- 9A01 B4
- 9A02 C5
- FA21 G4
- FK02 C6
- FK11 D7
- IA05 F3
- IA68 B3
- IA69 B7
- IA70 B8
- IA71 B3
- IA72 B2
- IA73 C3
- IA74 C6
- IA75 C8
- IA76 C3
- IA77 D3
- IA78 D6
- IA79 E5
- IA80 E5
- IA81 F2
- IA82 F3
- IA83 G2
- IA88 C4
- IA89 D6
- IA92 D8
- IA97 G4

B4A PNX2015: Audio / Video



SSB: PN2015: DV I/O Interface

B4B PN2015: DV I/O Interface

B4B

3LR0 D4
3LR1 C4
3LR9-1 D4
3LR9-2 E4
3LR9-3 D4
3LR9-4 D4
3LS0-2 D4
3LS0-3 D4
3LS0-4 E4
3LS1-1 D4
3LS1-2 D4
3LS1-3 E4
3LS1-4 E4
7J00-2 B7
7J00-4 B2
AJ10 D8

A

A

B

B

C

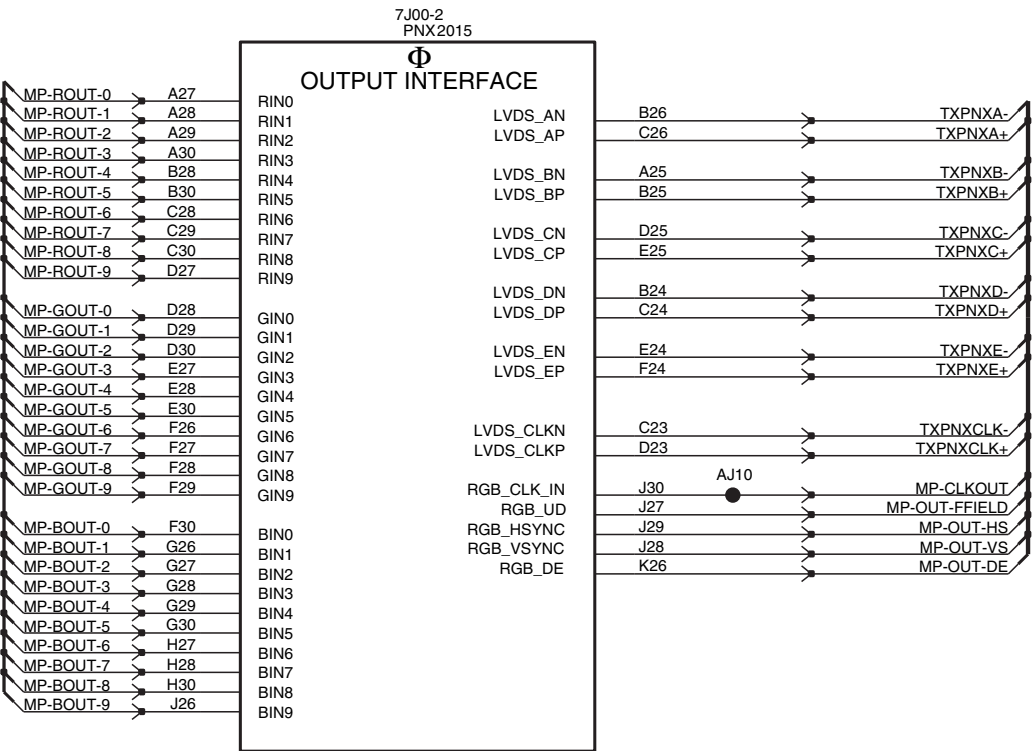
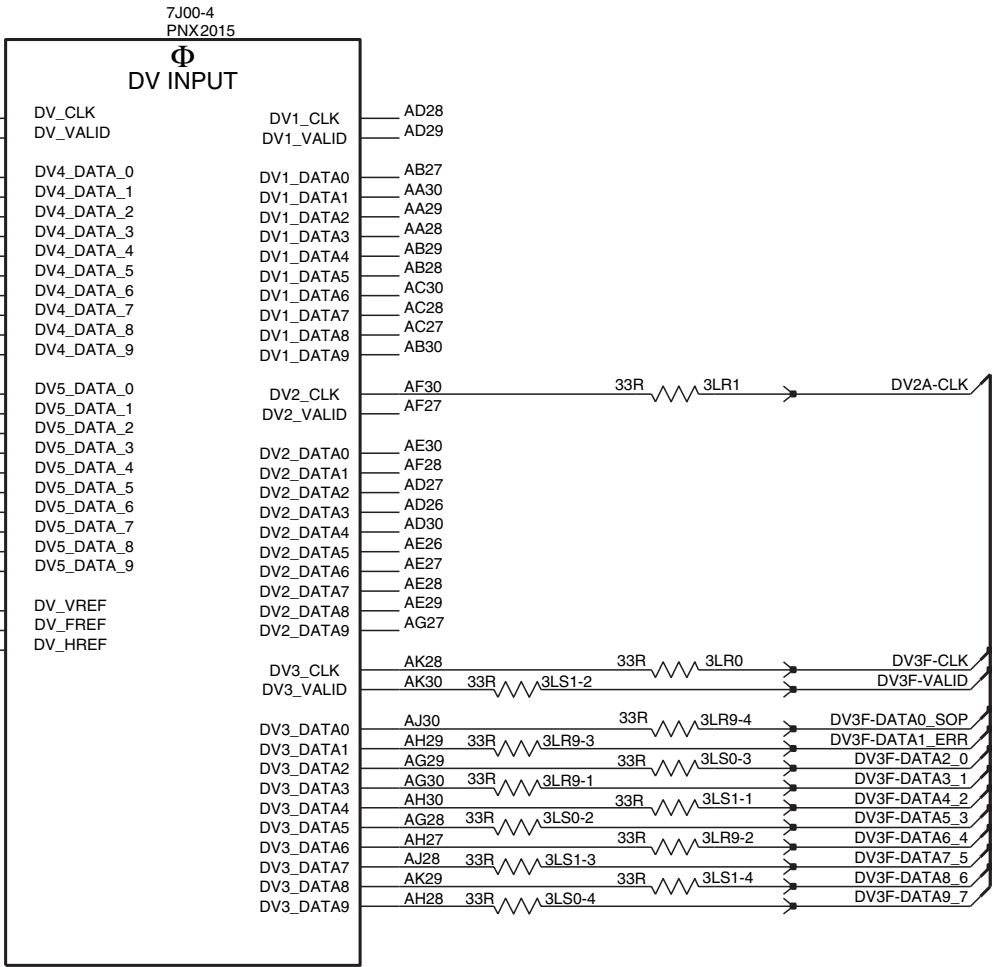
C

D

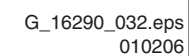
D

E

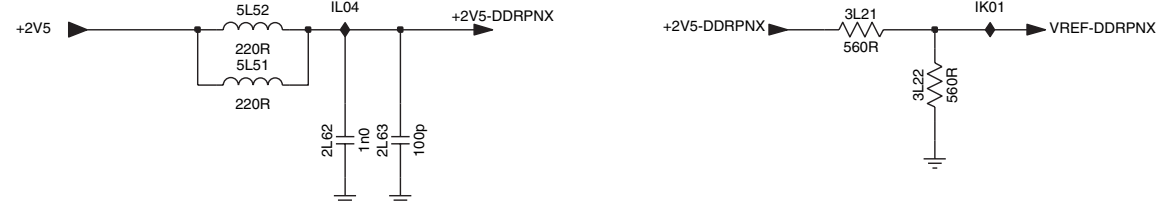
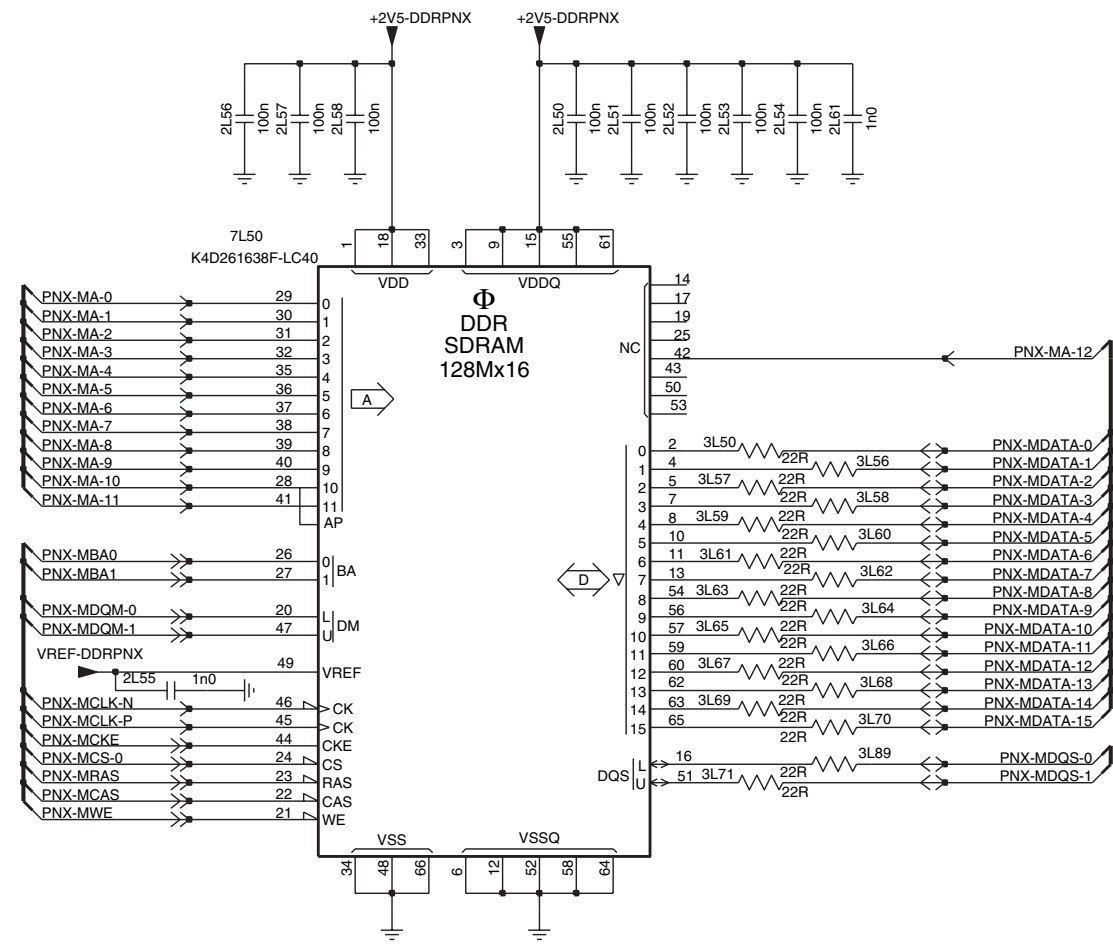
E



PNX 2015: TUNNELBUS



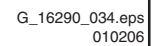
B4D PNX 2015: DDR Interface



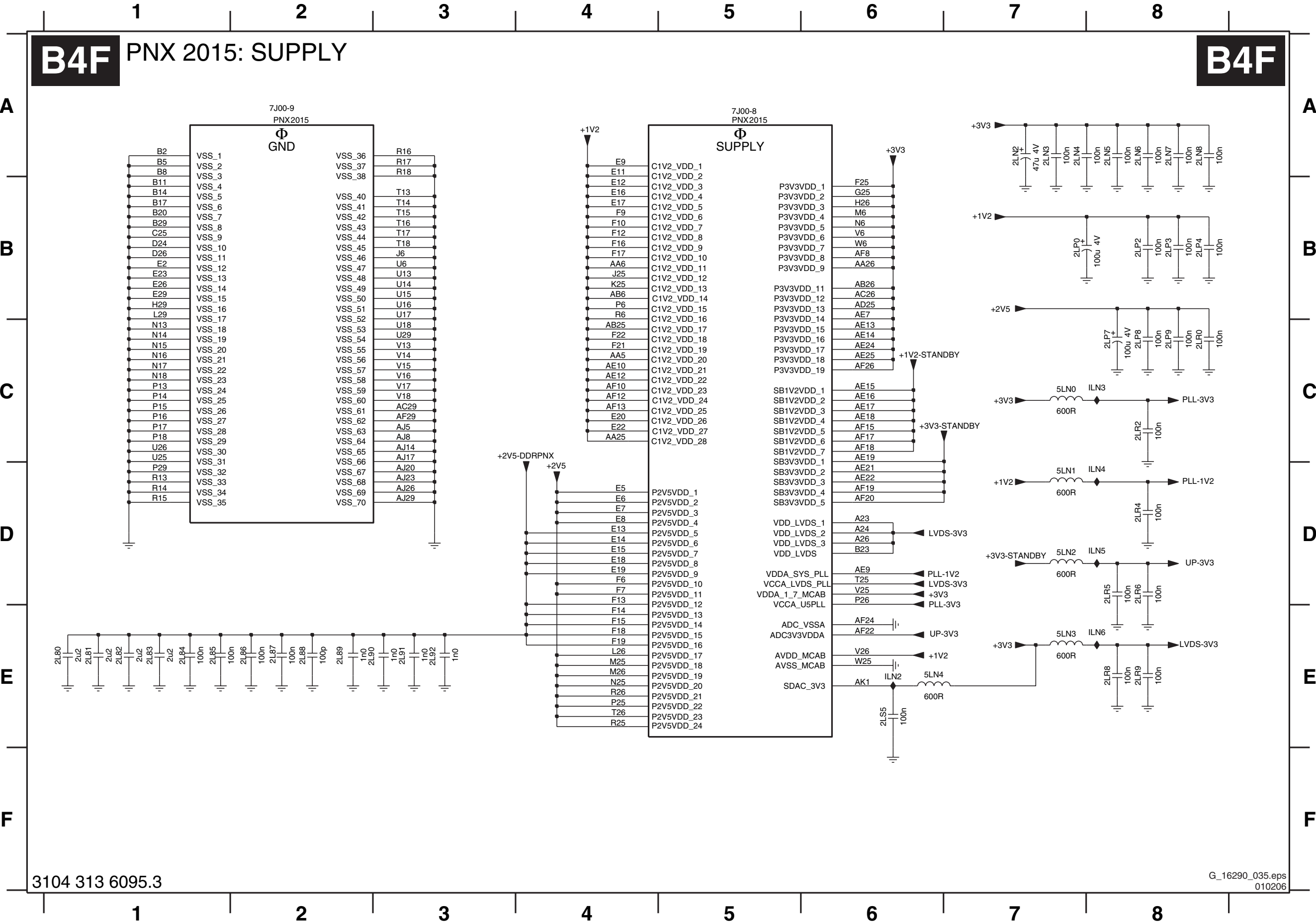
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2L50 A8
2L51 A8
2L52 A8
2L53 A9
2L54 A9
2L55 C6
2L56 A7
2L57 A7
2L58 A7
2L59 C5
2L60 C6
2L61 A9
2L62 E7
2L63 E7
3L40 A2
3L41 A1
3L42 A2
3L43 A1
3L44 B2
3L45 B1
3L46 B2
3L47 B1
3L48 B2
3L49 B1
3L50 B9
3L51 B4
3L52 B4
3L56 C9
3L57 C9
3L58 C9
3L59 C9
3L60 C9
3L61 C9
3L62 C9
3L63 C9
3L64 C9
3L65 C9
3L66 C9
3L67 C9
3L68 C9
3L69 C9
3L70 D9
3L71 D9
3L89 D9
3L90 B4
3L91 B2
3L92 B1
3L93 B2
3L94 B5
3L95 B4
3L96 C4
3L97 C4
3L98 C5
3L99 B5
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5L51 E7
5L52 E7
7J00-3 A3
7L50 B7
FLA9 C6
IL04 E7

B4E



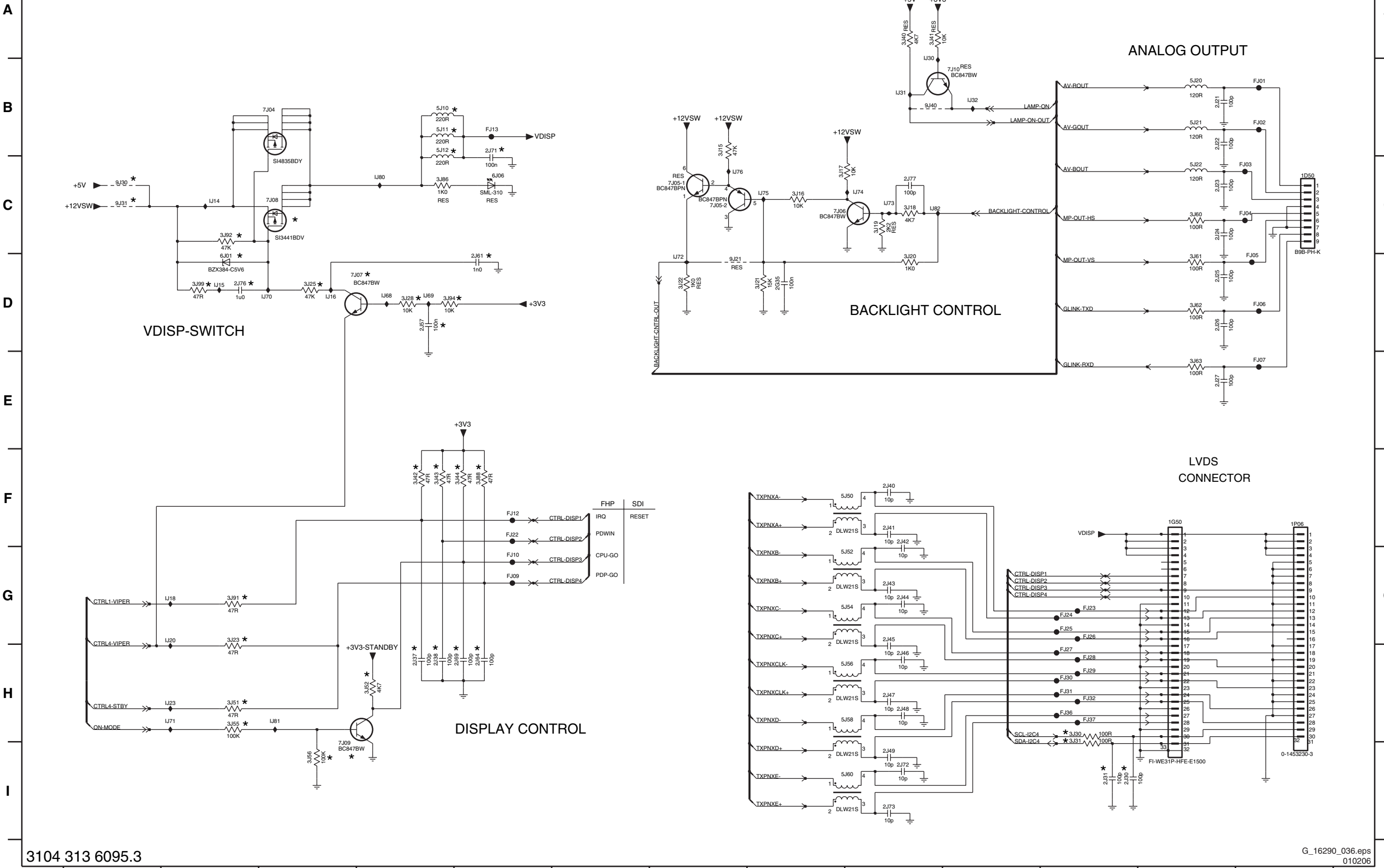
SSB: PNX2015: Supply



SSB: PN2015: Display Interface

B4G VIPER/PNX 2015: DISPLAY INTERFACE

B4G

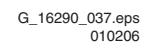


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1D50 C13	FJ12 F5
1G50 F12	FJ13 B5
1P06 F13	FJ22 F5
2G35 D8	FJ23 G11
2J21 B12	FJ24 G11
2J22 B12	FJ25 G11
2J23 C12	FJ26 G11
2J24 C12	FJ27 H11
2J25 D12	FJ28 H11
2J26 D12	FJ29 H11
2J27 E12	FJ30 H11
2J30 I11	FJ31 H11
2J31 I11	FJ32 H11
2J37 H4	FJ36 H11
2J38 H4	FJ37 H11
2J40 F9	IJ14 C2
2J41 F9	IJ15 D2
2J42 F9	IJ16 D3
2J43 G9	IJ18 G2
2J44 G9	IJ20 G2
2J45 G9	IJ23 H2
2J46 H9	IJ30 A9
2J47 H9	IJ31 B9
2J48 H9	IJ32 B10
2J49 I9	IJ68 D4
2J57 D4	IJ69 D4
2J61 D5	IJ70 D3
2J64 H5	IJ71 H2
2J69 H5	IJ72 D7
2J71 B5	IJ73 C9
2J72 I9	IJ74 C9
2J73 I9	IJ75 C8
2J76 D2	IJ76 C7
2J77 C9	IJ80 C4
3J15 B7	IJ81 H3
3J16 C8	IJ82 C9
3J17 C8	
3J18 C9	
3J19 C9	
3J20 D9	
3J21 D8	
3J22 D7	
3J23 G2	
3J25 D3	
3J28 D4	
3J28 D4	
3J30 H11	
3J31 I11	
3J40 A9	
3J41 A9	
3J42 F4	
3J43 F4	
3J44 F5	
3J51 H2	
3J52 H4	
3J55 H2	
3J56 I3	
3J60 C12	
3J61 D12	
3J62 D12	
3J63 E12	
3J86 C4	
3J88 F5	
3J91 G2	
3J92 C2	
3J94 D4	
3J99 D2	
5J10 B4	
5J11 B4	
5J12 B4	
5J20 B12	
5J21 B12	
5J22 C12	
5J50 F9	
5J52 G9	
5J54 G9	
5J56 H9	
5J58 H9	
5J60 I9	
6J01 D2	
6J06 C5	
7J04 B3	
7J05-1 C7	
7J05-2 C7	
7J06 C9	
7J07 C4	
7J08 C3	
7J09 I3	
7J10 B10	
9J21 D7	
9J30 C1	
9J31 C1	
9J40 B9	
FJ01 B13	
FJ02 B13	
FJ03 C13	
FJ04 C13	
FJ05 D13	
FJ06 D13	
FJ07 E13	
FJ09 G5	
FJ10 G5	

OH00 B10	1H00 B2	2H06 G10	3H04 B13	3H11 D1	3H24 G7	3H54 F4	3H70 E8	3H75 B2	3H80-4 C8	3H84 E8	3H90 B1	3H99 B4	3Q12 B4	3Q17 I7	3Q22 G13	3Q48 B4	6H01 F1	9H02 F3	9H07 D1	AH10 A8	FQ02 H15	FQ21 C1	FQ50 D4	IQ03 H10	IQ22 G6	IQ28 G7
OH02 B11	1H20 B10	2H07 G10	3H05 B13	3H16 C3	3H25 G7	3H55 E4	3H71 D1	3H79 A8	3H81-1 C8	3H85 E1	3H94 I7	3Q03 B2	3Q13 B4	3Q18 I8	3Q23 H10	3Q52 D4	6H03 G1	9H03 C4	9H08 D1	AH11 B2	FQ03 E4	FQ22 C1	FQ52 F4	IQ04 H10	IQ23 G7	IQ30 F1
OH05 C10	1M00 A11	2H08 A1	3H06 A10	3H17 C3	3H31 F1	3H56 E4	3H72 E7	3H80-1 D8	3H81-2 C8	3H86 E8	3H95 I7	3Q04 B2	3Q14 B4	3Q19 F13	3Q24 F10	5H02 H11	6H07-1 G13	9H04 C1	9H13 D1	FH12 H7	FQ04 H14	FQ23 C1	FQ53 F4	IQ05 H10	IQ24 G7	
OH09 C10	1M00 H11	2H09 B1	3H08 C3	3H22 C13	3H40 E1	3H57 D4	3H73 B8	3H80-2 C8	3H81-3 D8	3H88 F8	3H97 G1	3Q10 B4	3Q15 B4	3Q20 H11	3Q27 B1	5H03 G13	6H02-2 G12	9H05 F4	9H15 F3	FQ00 H15	FQ10 C1	FQ40 B2	IH09 D1	IQ16 F10	IQ25 H7	
OH10 C10	1M60 C15	2Q69 G14	3H10 D1	3H22 C13	3H41 F1	3H69 D3	3H74 B8	3H80-3 D8	3H82 B2	3H89 F10	3H98 C4	3Q11 B4	3Q16 H10	3Q21 H11	3Q29 F13	6H00 I7	7V00-5 A5	9H06 E3	9H16 C4	FQ01 H14	FQ10 G1	FQ41 B2	IH16 D6	IQ17 G13	IQ27 F7	

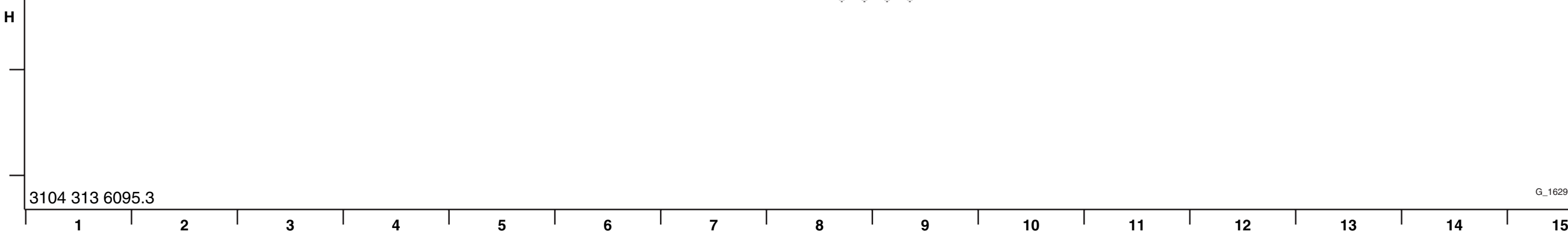
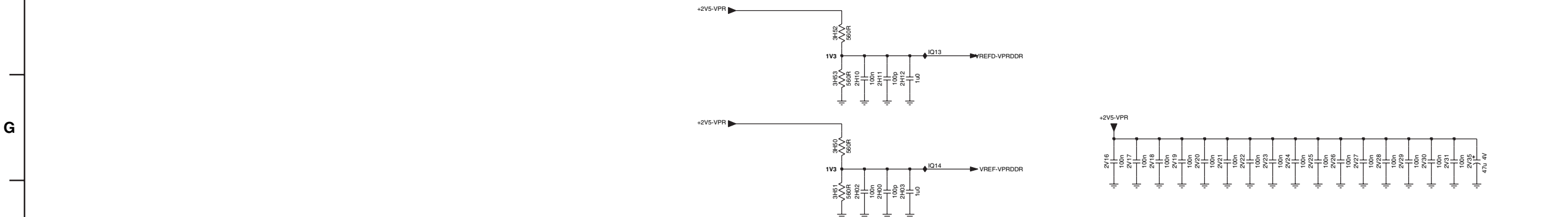
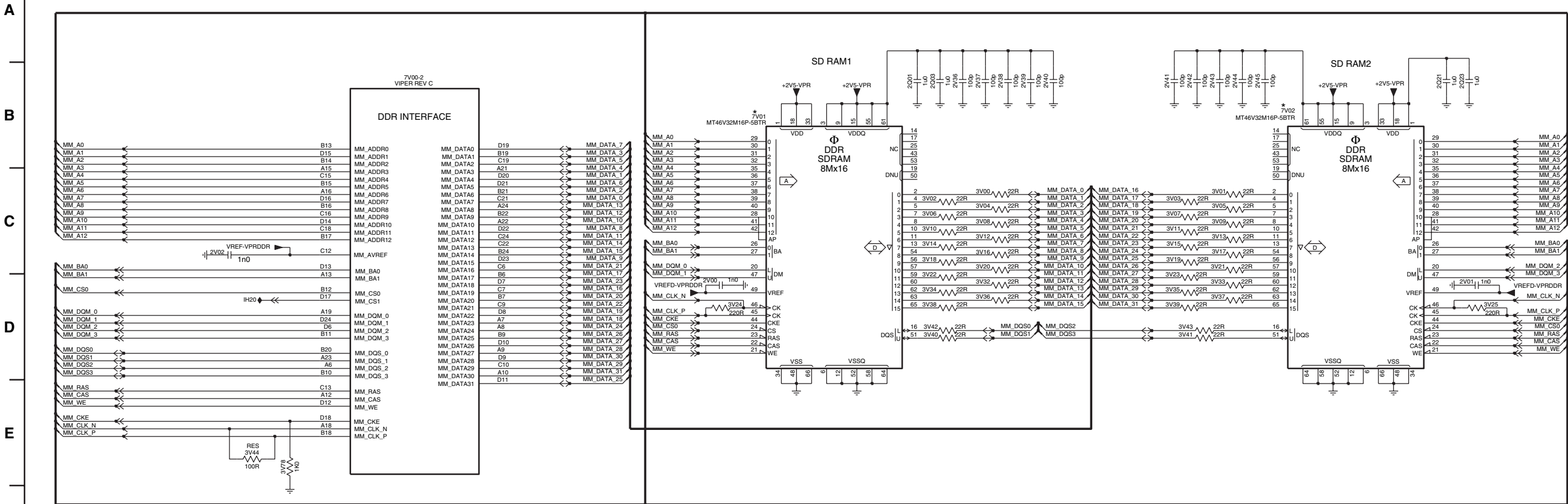


SSB: Viper: Main Memory

B5B

VIPER: MAIN MEMORY

B5B



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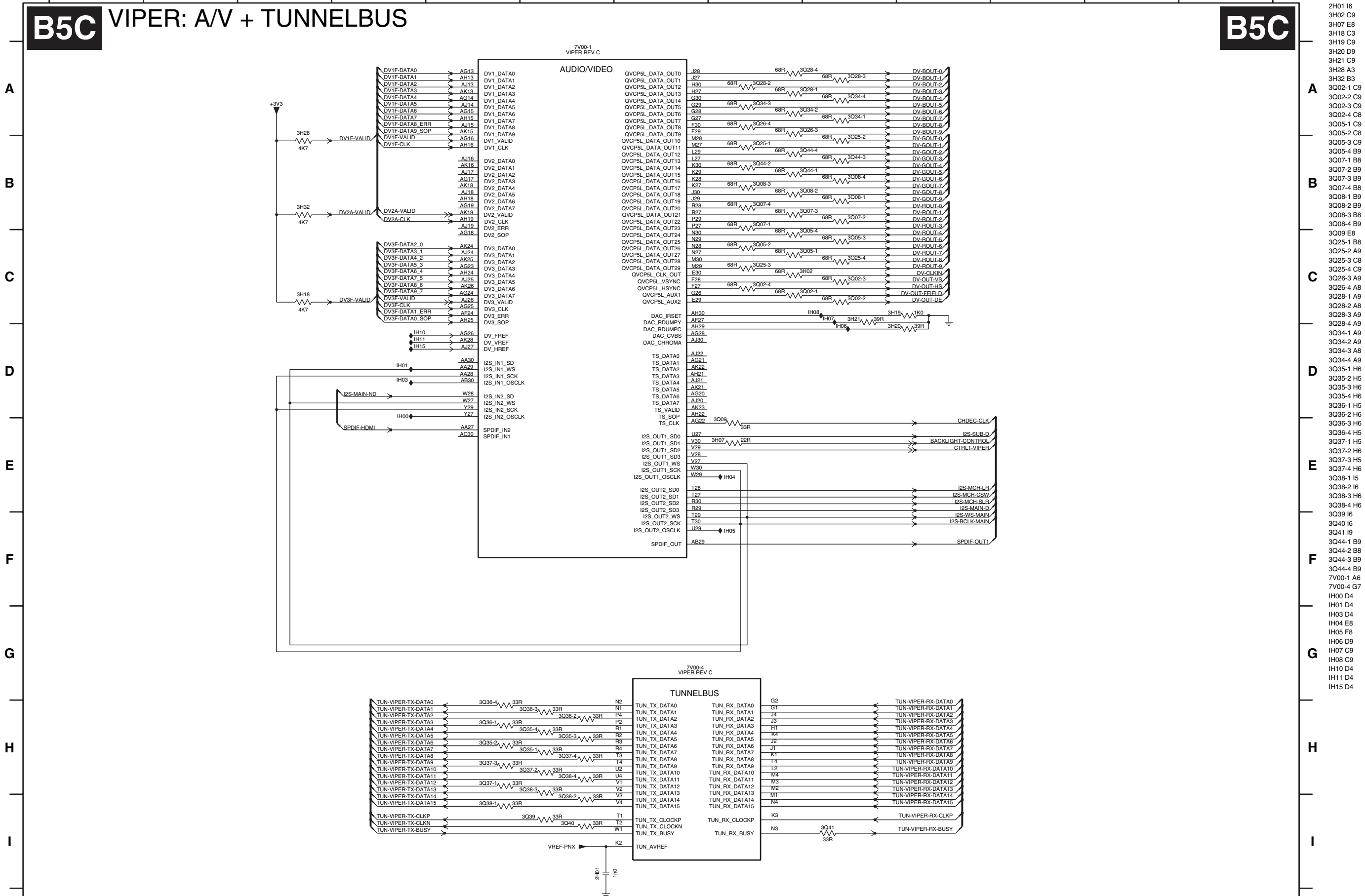
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2H02 H8
2H03 H9
2H10 G8
2H11 G9
2H12 G9
2Q01 B9
2Q03 B9
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2Q23 B14
2V00 D7
2V01 D14
2V02 C2
2V16 G11
2V17 G11
2V18 G11
2V19 G11
2V20 G12
2V21 G12
2V22 G12
2V23 G12
2V24 G12
2V25 G13
2V26 G13
2V27 G13
2V28 G13
2V29 G14
2V30 G14
2V31 G14
2V35 G14
2V36 B9
2V37 B10
2V38 B10
2V39 B10
2V40 B10
2V41 B11
2V42 B12
2V43 B12
2V44 B12
2V45 B12
3H50 G8
3H51 H8
3H52 F8
3H53 G8
3V00 C10
3V01 C12
3V02 C9
3V03 C11
3V04 C10
3V05 C12
3V06 C9
3V07 C11
3V08 C10
3V09 C12
3V10 C9
3V11 C11
3V12 C10
3V13 C12
3V14 C9
3V15 C11
3V16 C10
3V17 C12
3V18 C9
3V19 C11
3V20 C10
3V21 C12
3V22 D9
3V23 D11
3V24 D7
3V25 D14
3V32 D10
3V33 D12
3V34 D9
3V35 D11
3V36 D10
3V37 D12
3V38 D9
3V39 D11
3V40 D9
3V41 D11
3V42 D9
3V43 D11
3V44 E3
3V78 E3
7V00-2 B4
7V01 B7
7V02 B12
IH20 D3
IQ13 F9
IQ14 G9

SSB: Viper: A/V + Tunnelbus

B5C

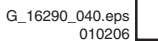
VIPER: A/V + TUNNELBUS

B5C

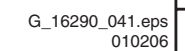
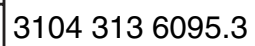


- 2H01 I6
- 3H02 C9
- 3H07 E8
- 3H18 C3
- 3H19 C9
- 3H20 D9
- 3H21 C9
- 3H28 A3
- 3H32 B3
- 3Q02-1 C9
- 3Q02-2 C9
- 3Q02-3 C9
- 3Q02-4 C8
- 3Q05-1 C9
- 3Q05-2 C8
- 3Q05-3 C9
- 3Q05-4 B9
- 3Q07-1 B8
- 3Q07-2 B9
- 3Q07-3 B9
- 3Q07-4 B8
- 3Q08-1 B9
- 3Q08-2 B9
- 3Q08-3 B8
- 3Q08-4 B9
- 3Q09 E8
- 3Q25-1 B8
- 3Q25-2 A9
- 3Q25-3 C8
- 3Q25-4 C9
- 3Q26-3 A9
- 3Q26-4 A8
- 3Q28-1 A9
- 3Q28-2 A8
- 3Q28-3 A9
- 3Q28-4 A9
- 3Q34-1 A9
- 3Q34-2 A9
- 3Q34-3 A8
- 3Q34-4 A9
- 3Q35-1 H6
- 3Q35-2 H5
- 3Q35-3 H6
- 3Q35-4 H6
- 3Q36-1 H5
- 3Q36-2 H6
- 3Q36-3 H6
- 3Q36-4 H5
- 3Q37-1 H5
- 3Q37-2 H6
- 3Q37-3 H5
- 3Q37-4 H6
- 3Q38-1 I5
- 3Q38-2 I6
- 3Q38-3 H6
- 3Q38-4 H6
- 3Q39 I6
- 3Q40 I6
- 3Q41 I9
- 3Q44-1 B9
- 3Q44-2 B8
- 3Q44-3 B9
- 3Q44-4 B9
- 7V00-1 A6
- 7V00-4 G7
- IH00 D4
- IH01 D4
- IH03 D4
- IH04 E8
- IH05 F8
- IH06 D9
- IH07 C9
- IH08 C9
- IH10 D4
- IH11 D4
- IH15 D4

2Q00 D10	2Q05 D12	2Q08 D12	2Q11 D13	2Q14 D14	2Q17 D15	2Q20 E10	2Q26 E12	2Q30 E12	2Q34 E13	2Q38 E14	2Q42 D11	2Q45 D12	2Q48 D12	2Q51 D13	2Q54 D14	2Q57 D15	2Q60 F10	2Q63 C8	2Q66 C10	2Q77 C9	2Q80 D11	2Q83 E11	2Q86 F14	2Q89 F15	5Q01 B8	5Q04 B10	7V00-3 C1	IQ09 C8
2Q02 D11	2Q06 D12	2Q09 D13	2Q12 D13	2Q15 D14	2Q18 D15	2Q22 E11	2Q27 E12	2Q32 E13	2Q35 E14	2Q39 E14	2Q43 D11	2Q46 D12	2Q49 D13	2Q52 D13	2Q55 D14	2Q58 D15	2Q61 F11	2Q64 C8	2Q67 C9	2Q78 C9	2Q81 D10	2Q84 F13	2Q87 F14	2Q90 F15	5Q02 B8	5Q07 F11	IQ07 C8	IQ10 B8
2Q04 D11	2Q07 D12	2Q10 D13	2Q13 D14	2Q16 D14	2Q19 D15	2Q24 E11	2Q28 E12	2Q33 E13	2Q37 E14	2Q40 D10	2Q44 D11	2Q47 D12	2Q50 D13	2Q53 D14	2Q56 D14	2Q59 D15	2Q62 F11	2Q65 C9	2Q76 C8	2Q79 D10	2Q82 E10	2Q85 F14	2Q88 F14	2Q91 F13	5Q03 B9	5Q08 F11	IQ08 C10	IQ11 F11



B5E VIPER: EEPROM

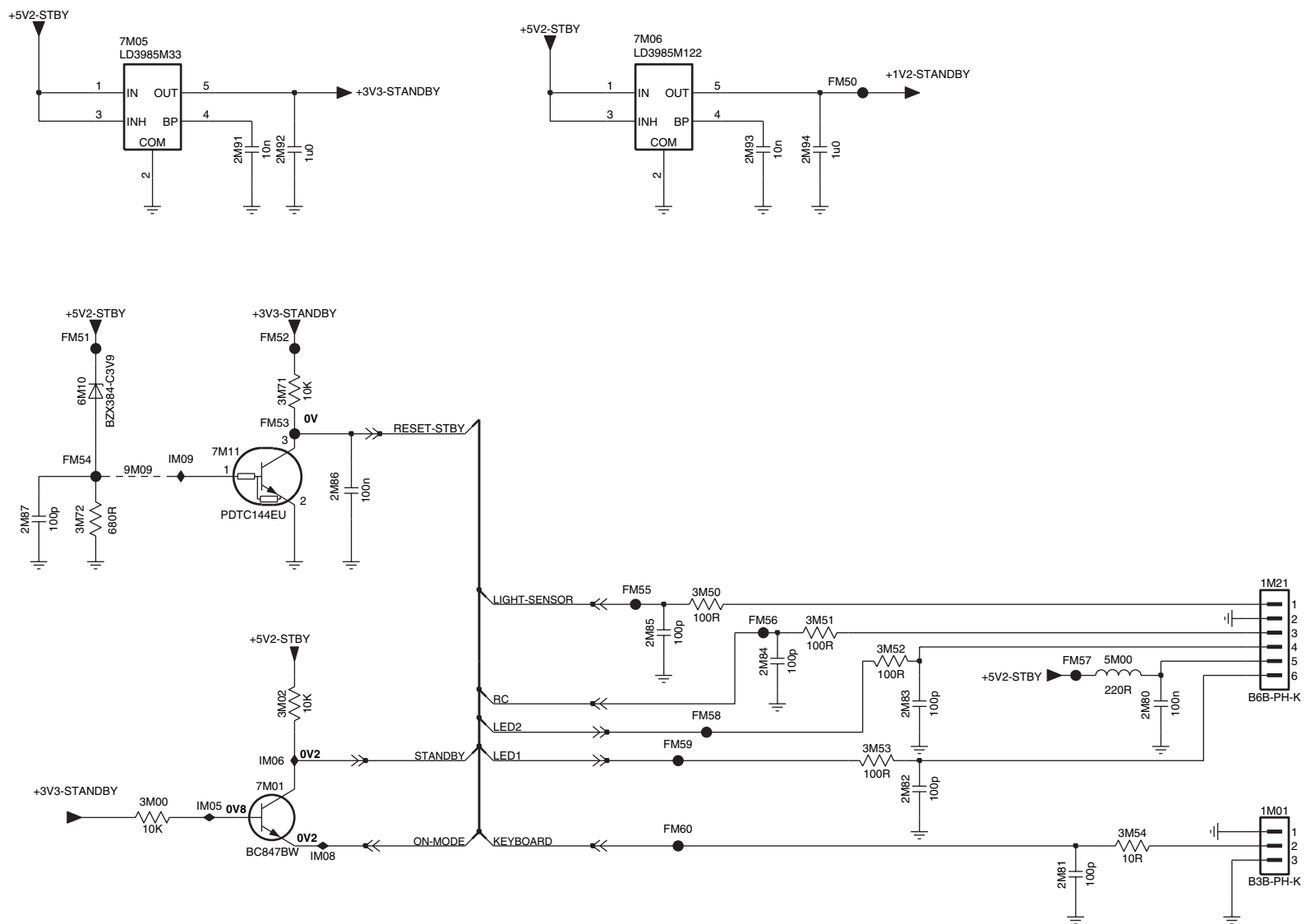


2P35 C3
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2P81 C8
3P37 A4
3P57 F3
3P80 B8
3P81 C8
3P82 F7
3P83 D2
3P84 D2
3P85 D2
3P86 E2
3P88 E2
7P14 B3
7P15-1 D2
7P15-2 D3
7P15-3 E2
7P15-4 E2
7P16 F1
7P17 F2
7P18 A3
7P80 C8
9P16 B4
9P17 C4
9P42 A3
FP22 B4
FP23 D1
FP32 E2
FP33 F1
FP34 B4
FP35 B4
FP36 A3
IP10 A3
IP11 E7
IP16 D8

SSB: Miscellaneous

B5F MISCELLANEOUS

B5F

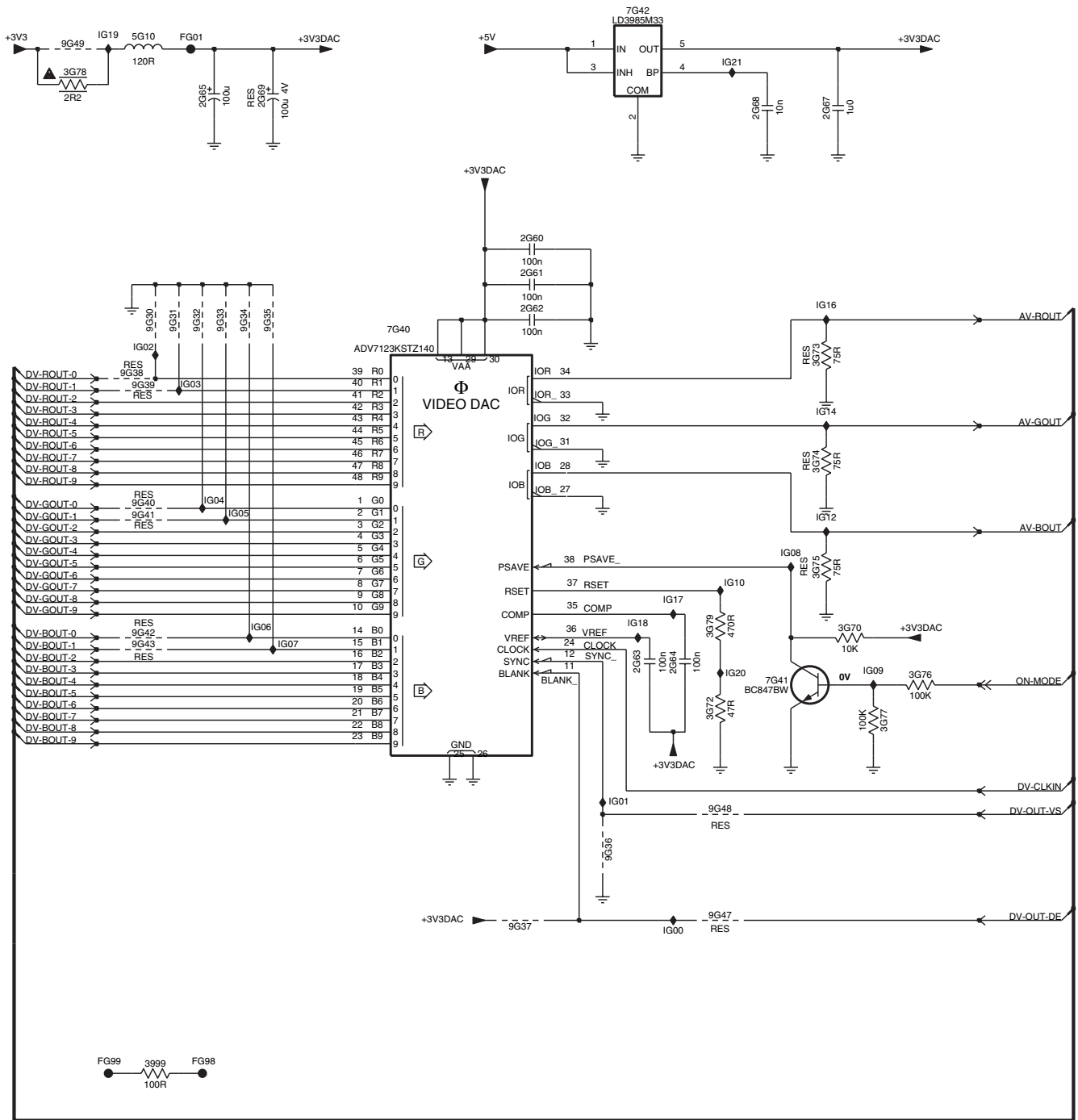


- 1M01 E7
- 1M21 D7
- 2M80 E7
- 2M81 F6
- 2M82 E5
- 2M83 E5
- 2M84 E5
- 2M85 D4
- 2M86 D3
- 2M87 D1
- 2M91 B2
- 2M92 B2
- 2M93 B5
- 2M94 B5
- 3M00 E2
- 3M02 E2
- 3M50 D4
- 3M51 D5
- 3M52 E5
- 3M53 E5
- 3M54 E7
- 3M71 C2
- 3M72 D1
- 5M00 E6
- 6M10 C1
- 7M01 E2
- 7M05 A1
- 7M06 A4
- 7M11 D2
- 9M09 D2
- FM50 B5
- FM51 C1
- FM52 C2
- FM53 C2
- FM54 D1
- FM55 D4
- FM56 D5
- FM57 E6
- FM58 E4
- FM59 E4
- FM60 E4
- IM05 E2
- IM06 E2
- IM08 F2
- IM09 D2

SSB: Video DAC

B6 VIDEO-DAC

B6



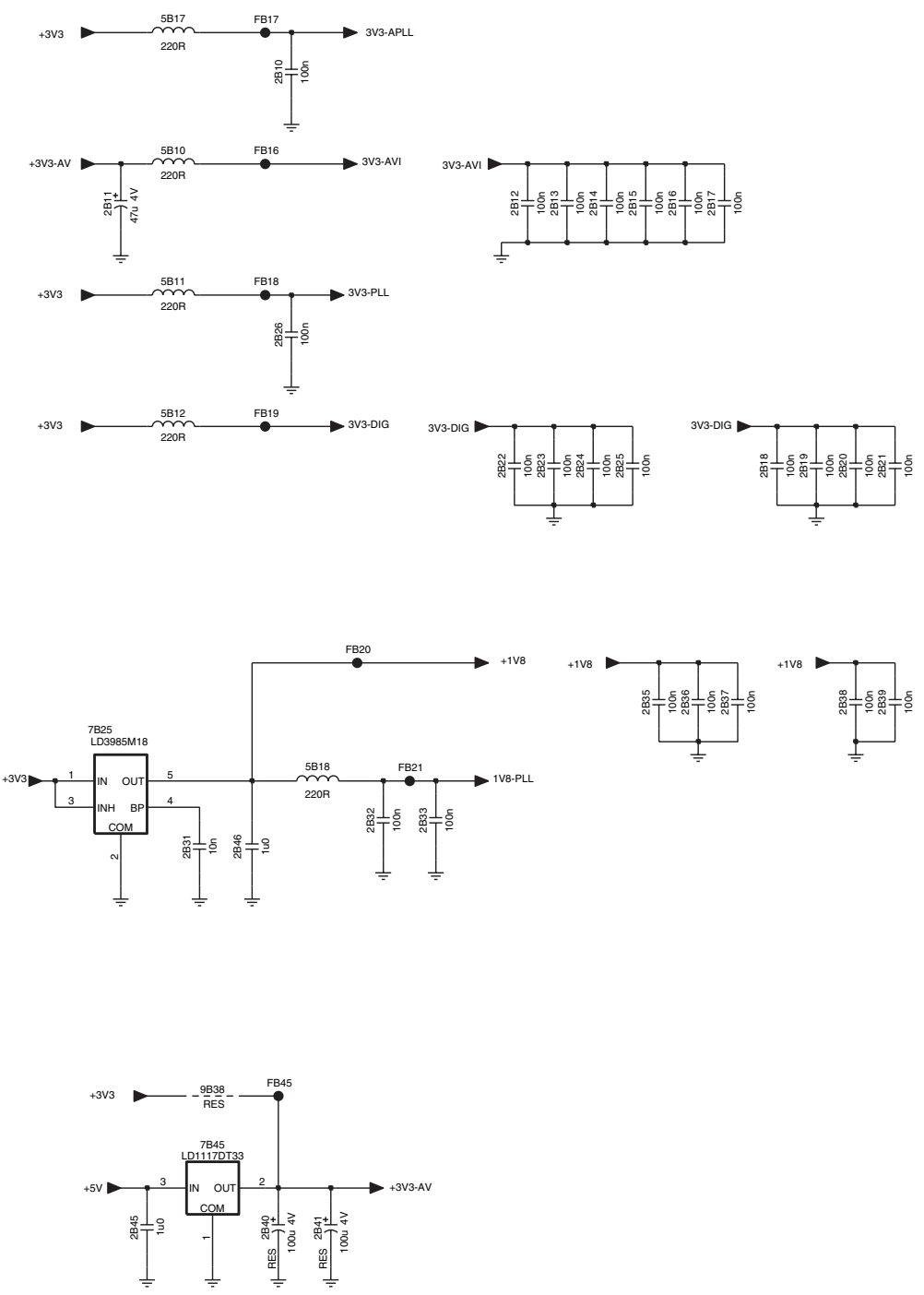
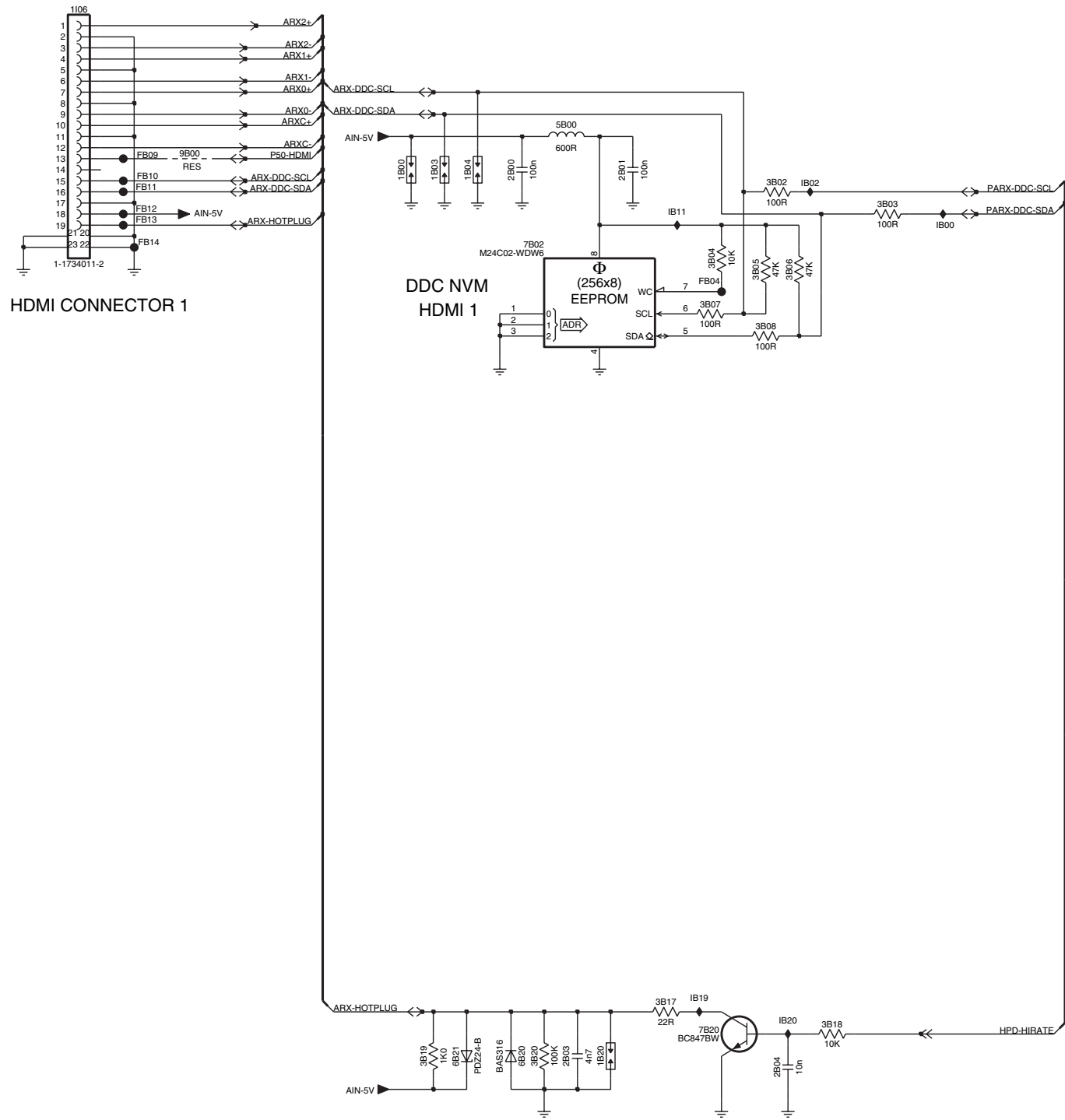
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DV-OUT-VS	cG12	MP-OUT-VS
DV-OUT-DE	cG13	MP-OUT-DE
DV-OUT-FIELD	cG14	MP-OUT-FIELD
DV-ROUT-0	cG15	MP-ROUT-0
DV-ROUT-1	cG16	MP-ROUT-1
DV-ROUT-2	cG17	MP-ROUT-2
DV-ROUT-3	cG18	MP-ROUT-3
DV-ROUT-4	cG19	MP-ROUT-4
DV-ROUT-5	cG20	MP-ROUT-5
DV-ROUT-6	cG21	MP-ROUT-6
DV-ROUT-7	cG22	MP-ROUT-7
DV-ROUT-8	cG23	MP-ROUT-8
DV-ROUT-9	cG24	MP-ROUT-9
DV-GOUT-0	cG25	MP-GOUT-0
DV-GOUT-1	cG26	MP-GOUT-1
DV-GOUT-2	cG27	MP-GOUT-2
DV-GOUT-3	cG28	MP-GOUT-3
DV-GOUT-4	cG29	MP-GOUT-4
DV-GOUT-5	cG30	MP-GOUT-5
DV-GOUT-6	cG31	MP-GOUT-6
DV-GOUT-7	cG32	MP-GOUT-7
DV-GOUT-8	cG33	MP-GOUT-8
DV-GOUT-9	cG34	MP-GOUT-9
DV-ROUT-0	cG35	MP-ROUT-0
DV-ROUT-1	cG36	MP-ROUT-1
DV-ROUT-2	cG37	MP-ROUT-2
DV-ROUT-3	cG38	MP-ROUT-3
DV-ROUT-4	cG39	MP-ROUT-4
DV-ROUT-5	cG40	MP-ROUT-5
DV-ROUT-6	cG41	MP-ROUT-6
DV-ROUT-7	cG42	MP-ROUT-7
DV-ROUT-8	cG43	MP-ROUT-8
DV-ROUT-9	cG44	MP-ROUT-9

- 2G60 C5
- 2G61 C5
- 2G62 C5
- 2G63 E6
- 2G64 E6
- 2G65 B3
- 2G67 B7
- 2G68 B6
- 2G69 B3
- 3999 H3
- 3G70 E7
- 3G72 F6
- 3G73 D7
- 3G74 D7
- 3G75 E7
- 3G76 E7
- 3G77 F7
- 3G78 B2
- 3G79 E6
- 5G10 B3
- 7G40 C4
- 7G41 F6
- 9G30 C3
- 9G31 C3
- 9G32 C3
- 9G33 C3
- 9G34 C3
- 9G35 C3
- 9G36 G5
- 9G37 G5
- 9G38 D2
- 9G39 D3
- 9G40 D3
- 9G41 D3
- 9G42 E3
- 9G43 E3
- 9G47 G6
- 9G48 F6
- 9G49 B2
- FG01 B3
- FG98 H3
- FG99 H2
- IG00 G6
- IG01 F5
- IG02 C3
- IG03 D3
- IG04 D3
- IG05 D3
- IG06 E3
- IG07 E3
- IG08 E6
- IG09 E7
- IG10 E6
- IG12 D7
- IG14 D7
- IG16 C7
- IG17 E6
- IG18 E6
- IG19 B2
- IG20 E6
- IG21 B6
- cG10 D10
- cG11 D10
- cG12 D10
- cG13 D10
- cG14 D10
- cG15 D10
- cG16 D10
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- cG18 D10
- cG19 D10
- cG20 D10
- cG21 E10
- cG22 E10
- cG23 E10
- cG24 E10
- cG25 E10
- cG26 E10
- cG27 E10
- cG28 E10
- cG29 E10
- cG30 E10
- cG31 E10
- cG32 F10
- cG33 F10
- cG34 F10
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- cG36 F10
- cG37 F10
- cG38 F10
- cG39 F10
- cG40 F10
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- cG42 F10
- cG43 G10
- cG44 G10

SSB: HDMI: Supply

B7A HDMI + SUPPLY

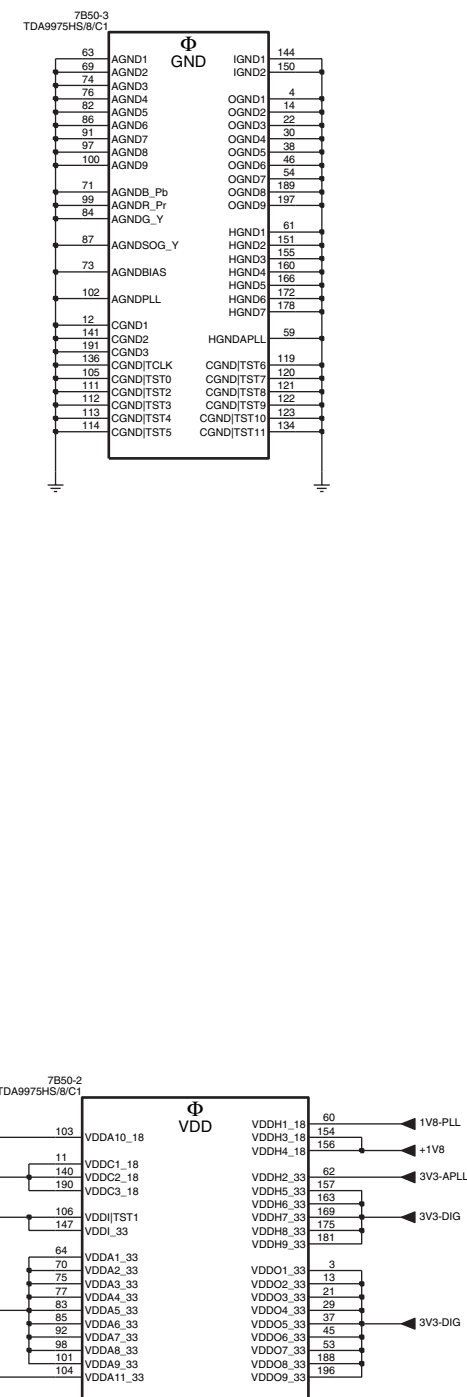
B7A



- 1B00 C3
- 1B03 C4
- 1B04 C4
- 1B20 I5
- 1I06 B1
- 2B00 C4
- 2B01 C5
- 2B03 I4
- 2B04 I6
- 2B10 B10
- 2B11 C9
- 2B12 C11
- 2B13 C11
- 2B14 C12
- 2B15 C12
- 2B16 C12
- 2B17 C12
- 2B18 E13
- 2B19 E13
- 2B20 E13
- 2B21 E13
- 2B22 E11
- 2B23 E11
- 2B24 E12
- 2B25 E12
- 2B26 D10
- 2B31 G9
- 2B32 G10
- 2B33 G11
- 2B35 F12
- 2B36 F12
- 2B37 F12
- 2B38 F13
- 2B39 F13
- 2B40 I10
- 2B41 I10
- 2B45 I9
- 2B46 G10
- 3B02 C6
- 3B03 C7
- 3B04 D5
- 3B05 D6
- 3B06 D6
- 3B07 D5
- 3B08 D6
- 3B17 H5
- 3B18 I6
- 3B19 I4
- 3B20 I4
- 5B00 C5
- 5B10 C9
- 5B11 D9
- 5B12 D9
- 5B17 B9
- 5B18 F10
- 6B20 I4
- 6B21 I4
- 7B02 D4
- 7B20 I5
- 7B25 F9
- 7B45 H10
- 9B00 C2
- 9B38 H10
- FB04 D5
- FB09 C2
- FB10 C2
- FB11 C2
- FB12 C2
- FB13 C2
- FB14 D2
- FB16 C10
- FB17 B10
- FB18 D10
- FB19 D10
- FB20 F10
- FB21 F11
- FB45 H10
- IB00 C7
- IB02 C6
- IB11 C5
- IB19 H5
- IB20 I6

B7B HDMI: I/O + CONTROL

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010206



2550 D1	IB63 G8
2551 D1	IB64 G8
2552 D1	IB67 C3
2555 C3	IB68 D3
2556 D2	IB69 E3
2557 D3	IB70 E3
2558 D6	
2559 D2	IB75 F3
2560 D3	
2561 E3	IB82 G6
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2565 E2	IB86 G4
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2572 G3	
2575 D3	
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2577 F3	
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2579 D5	
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3561 H5	
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3562-4 D9	
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3582 G6	
3583 E8	
3584 F8	
3585 G8	
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5565 C3	
5567 D3	
5569 E3	
5571 E3	
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5575 F3	
7550-1 B7	
7550-2 B11	
7550-3 G11	
9550 C5	
9551 G4	
9552 G5	
9553 G5	
9554 G9	
F800 G4	
F803 F8	
F804 F8	
IB53 C6	
IB57 B6	
IB58 E6	
IB59 F8	
IB60 F8	
IB61 F8	
IB62 G8	

SSB: Analog I/O

B7C ANALOG I/O

B7C

- 1100 G9
- 1101 C9
- 1102 E9
- 1103-1 C1
- 1103-2 E1
- 1103-3 G1
- 1104-1 B8
- 1104-2 E8
- 1104-3 G8
- 1107 G7
- 1108 F7
- 1109 G7
- 110A C7
- 110B E7
- 110E F2
- 110F G2
- 110G F10
- 110H D2
- 110I G2
- 110J C2
- 110K E2
- 110L C10
- 110M E10
- 110N H10
- 110P G10
- 1117 D7
- 2105 G6
- 2106 F6
- 2107 F3
- 2108 G4
- 2109 F11
- 210E H12
- 210F G12
- 2153 F12
- 3100 G6
- 3101 C6
- 3102 E6
- 3103 G6
- 3104 D6
- 3106 C6
- 3107 G6
- 3108 E6
- 3109 G6
- 310A F6
- 310B E3
- 310C F3
- 310D G3
- 310E G3
- 310F D3
- 310G D3
- 310H G3
- 310I G3
- 310J E3
- 310K D3
- 310L C3
- 310M C11
- 310P E11
- 310Q G12
- 3112 D6
- 3113 D6
- 3160 H12
- 3166 G12
- 3167 H12
- 3168 F12
- 3169 F12
- 5102 F11
- 6100 G7
- 6102 E7
- 6108 F7
- 6109 B7
- 610A D7
- 610D E2
- 610F G2
- 610H F10
- 610J C2
- 610L F2
- 610N B2
- 610P D2
- 610T B11
- 610V D11
- 610Y G11
- 6110 G11
- 6111 C7
- F100 G7
- F101 F7
- F103 G7
- F104 C7
- F105 D7
- F10C E2
- F10D G2
- F10E F10
- F10F D2
- F10G G2
- F10H D2
- F10I C2
- F10J C9
- F10K C10
- F10M H10
- F10N G10
- F10P D9
- F112 D7

A

B

C

D

E

F

G

H

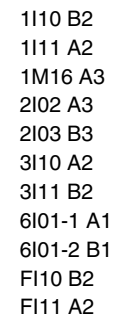
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010206

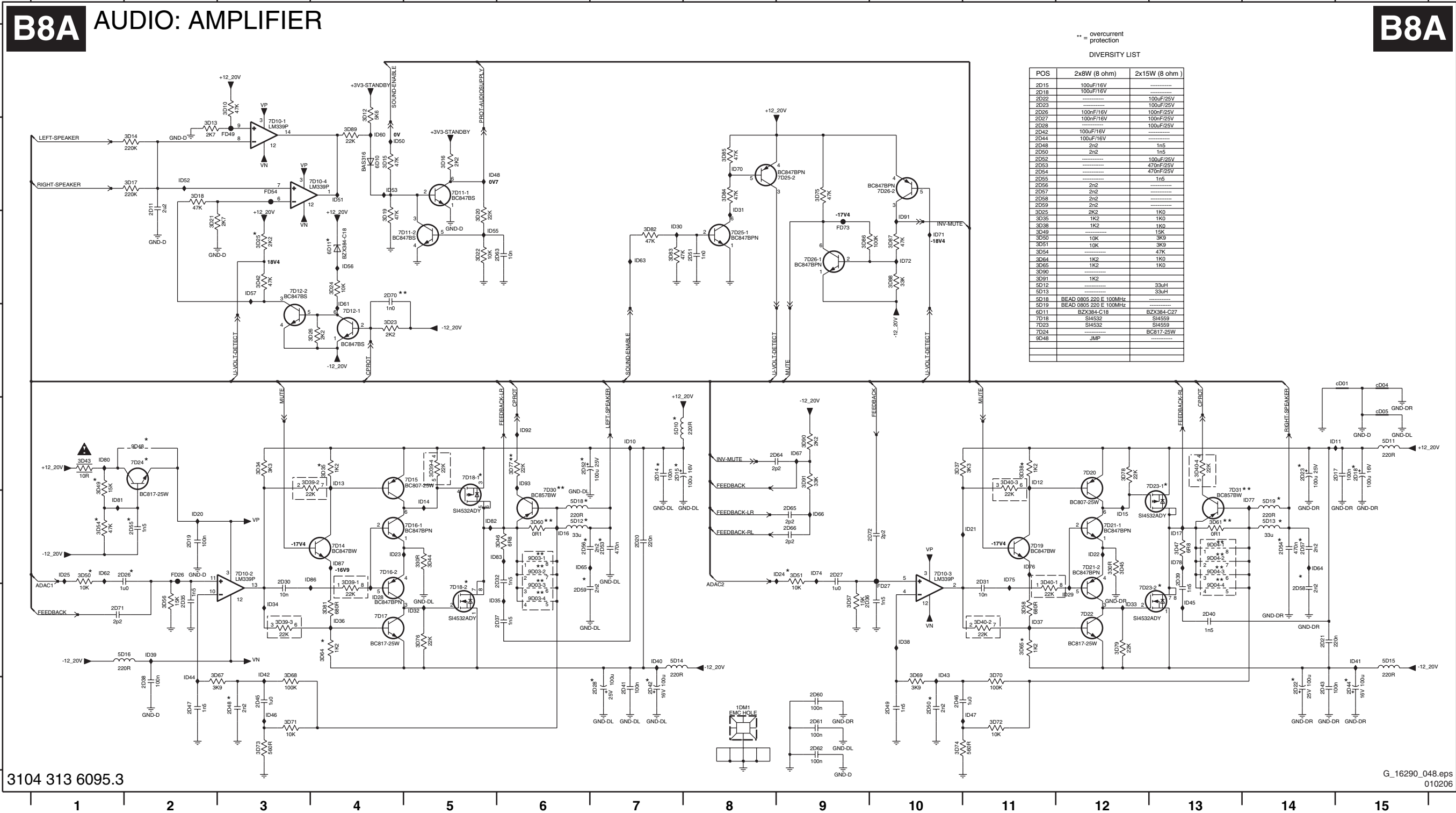
B7D UART

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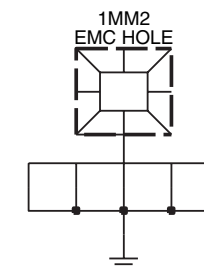
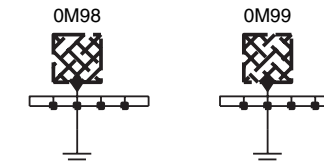
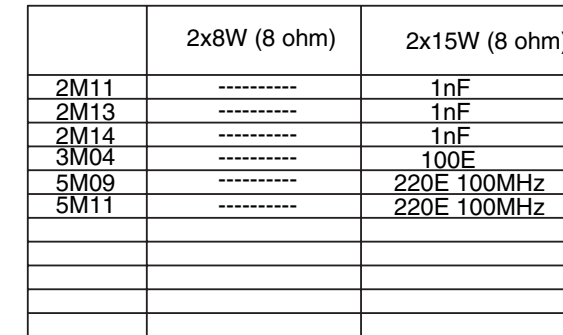
E_06532_012.eps
131004

SSB: Audio: Amplifier

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2D11 B2	2D23 E14	2D37 G6	2D46 H10	2D55 F2	2D64 E9	3D14 B2	3D23 D4	3D39-2 G4	3D44 F5	3D57 G9	3D70 H11	3D79 G12	3D89 B4	5D16 G2	7D11-1 B5	7D18-1 E5	7D24 E2	9D03-3 G6	FD49 B3	ID16 F6	ID29 G2	ID38 G10	ID47 H11	ID60 B4	ID71 C10	ID82 F5	cD05 E15
2D14 E7	2D26 F2	2D38 H2	2D47 H2	2D56 F6	2D65 F9	3D15 B4	3D24 C4	3D39-3 G4	3D45 F12	3D58 G11	3D71 H3	3D81 G4	3D90 E9	5D18 F6	7D11-2 C5	7D18-2 G5	7D25-1 C8	9D03-4 G6	FD54 B3	ID17 F13	ID30 C7	ID39 G2	ID48 B5	ID61 C4	ID72 C10	ID83 F5	
2D15 E7	2D27 F9	2D39 G13	2D48 H3	2D57 F14	2D66 F9	3D16 B5	3D25 C3	3D39-4 E5	3D46 F6	3D60 F6	3D72 H11	3D82 C7	3D91 E9	5D19 F14	7D12-1 D4	7D19 F11	7D25-2 B9	9D04-1 F13	FD73 C9	ID20 F2	ID31 B8	ID40 G7	ID50 B4	ID62 F1	ID74 F9	ID86 F4	
2D17 E15	2D28 H7	2D40 G13	2D49 H10	2D58 G14	2D67 C4	3D17 B2	3D26 D3	3D40-1 G11	3D47 F13	3D61 F13	3D73 H3	3D83 C7	3D90 E7	6D10 B4	7D12-2 C3	7D20 E12	7D26-1 C9	9D04-2 F13	ID10 E7	ID21 F11	ID32 G5	ID41 G15	ID51 B4	ID63 C7	ID75 F11	ID87 F4	
2D18 E15	2D30 F3	2D41 H7	2D50 H10	2D59 G6	2D71 G1	3D18 B2	3D34 E3	3D40-2 G11	3D49 E1	3D64 G4	3D74 H10	3D84 B8	3D91 E15	6D11 C4	7D14 F4	7D21-1 F12	7D26-2 B10	9D04-3 F13	ID11 E15	ID22 F12	ID33 G12	ID42 G3	ID52 B2	ID64 F14	ID76 F11	ID91 C10	
2D19 F2	2D31 F11	2D42 H7	2D51 C8	2D60 H9	2D72 F10	3D19 C4	3D35 E4	3D40-3 E11	3D50 F1	3D65 G11	3D75 B9	3D85 B8	3D92 F6	7D10-1 B3	7D15 E5	7D21-2 F12	7D30 F6	9D04-4 G13	ID12 E11	ID23 F4	ID34 G3	ID43 G10	ID53 B4	ID65 F6	ID77 F14	ID92 E6	
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B8B AUDIO: CONNECTORS



0M98 C6
0M99 C6
1740 C1
1M02 A1
1MM2 D6
2M10 A3
2M11 A3
2M12 B3
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2M16 C3
2M17 C3
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FM16 C2
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SSB: SRP List Part 1

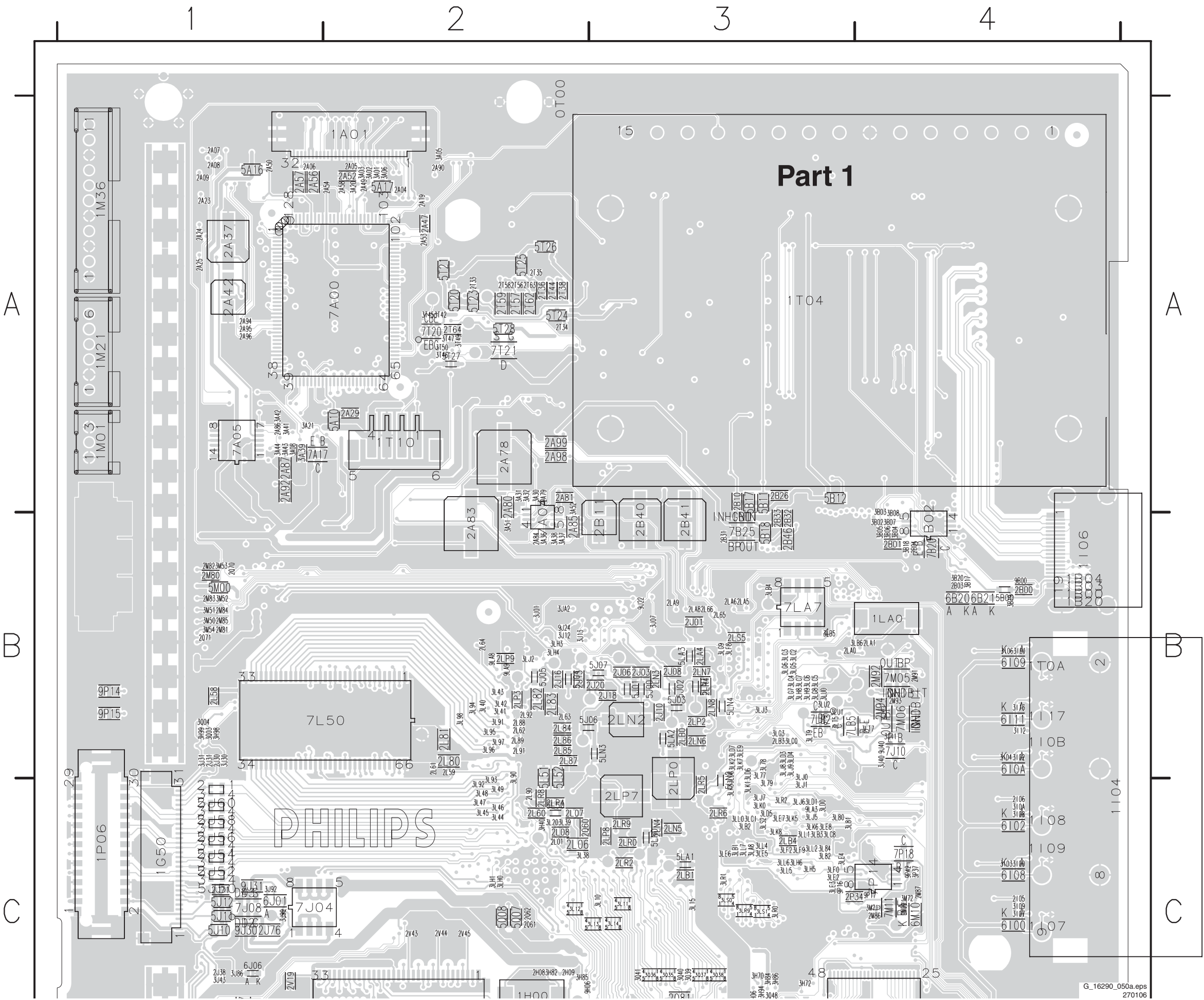
**SRP List: Not available at the time of writing. As soon as it becomes available,
a Service Info or Service Manual update will be issued via the appropriate channels.**

SSB: SRP List Part 2

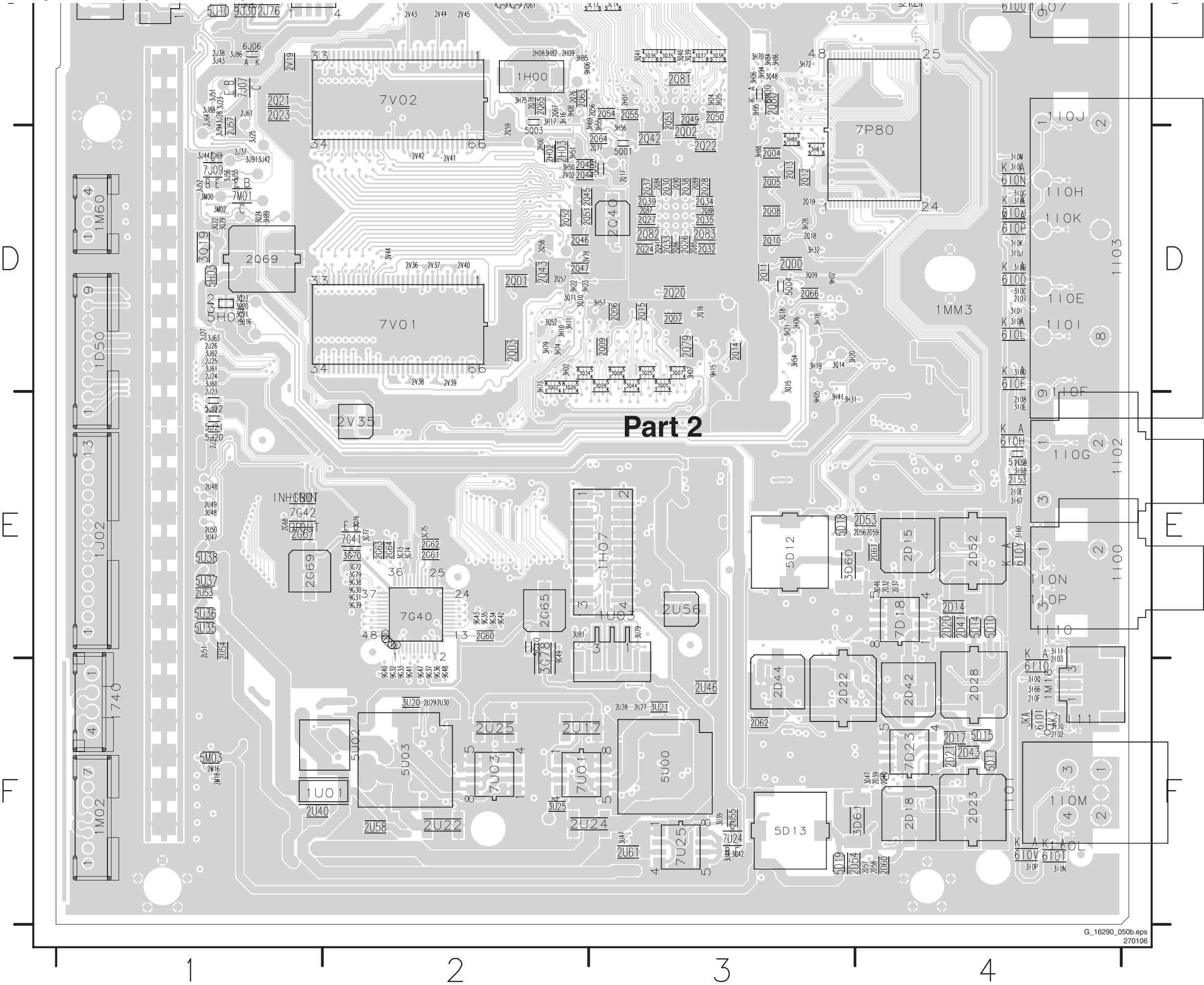
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1C62	A3	2C17	B3	2P24	F2	2TN1	A1	3A76	A2	3L57	B3	3P14	G1	3TH7	B1	3V04	E3	6C52	A3	7U17	G3	9U01	F3
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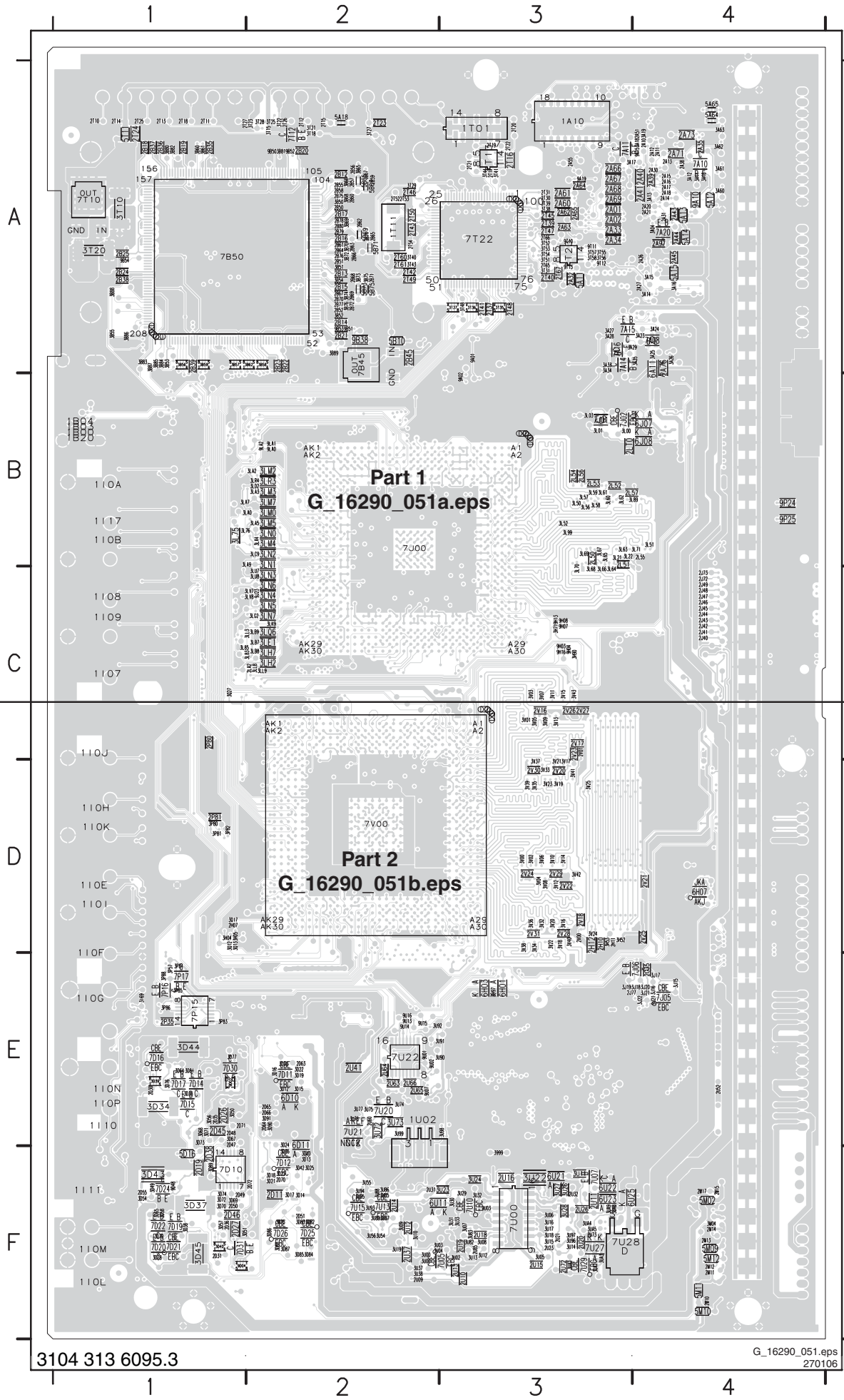
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Layout SSB (Top Side Part 2)

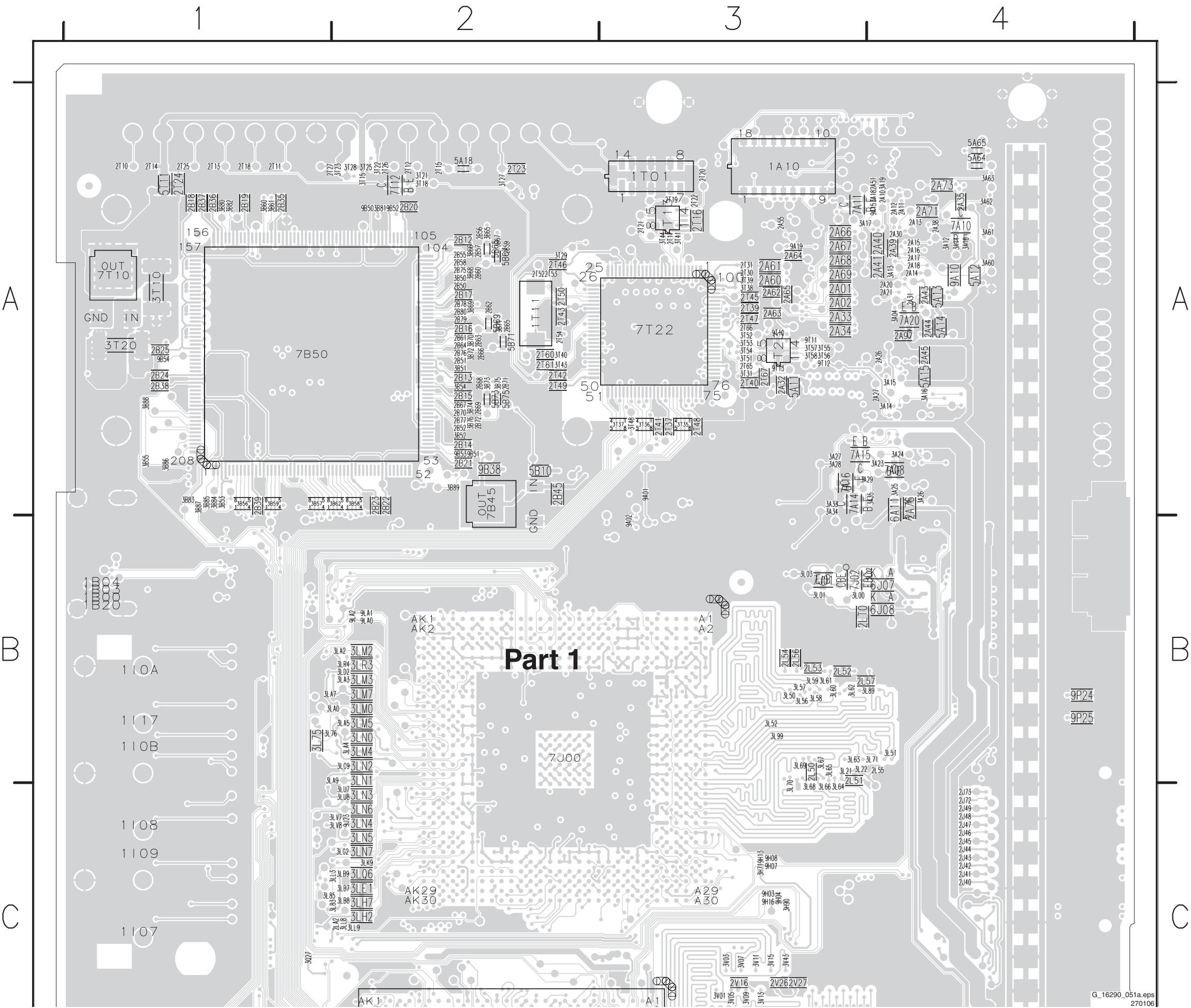


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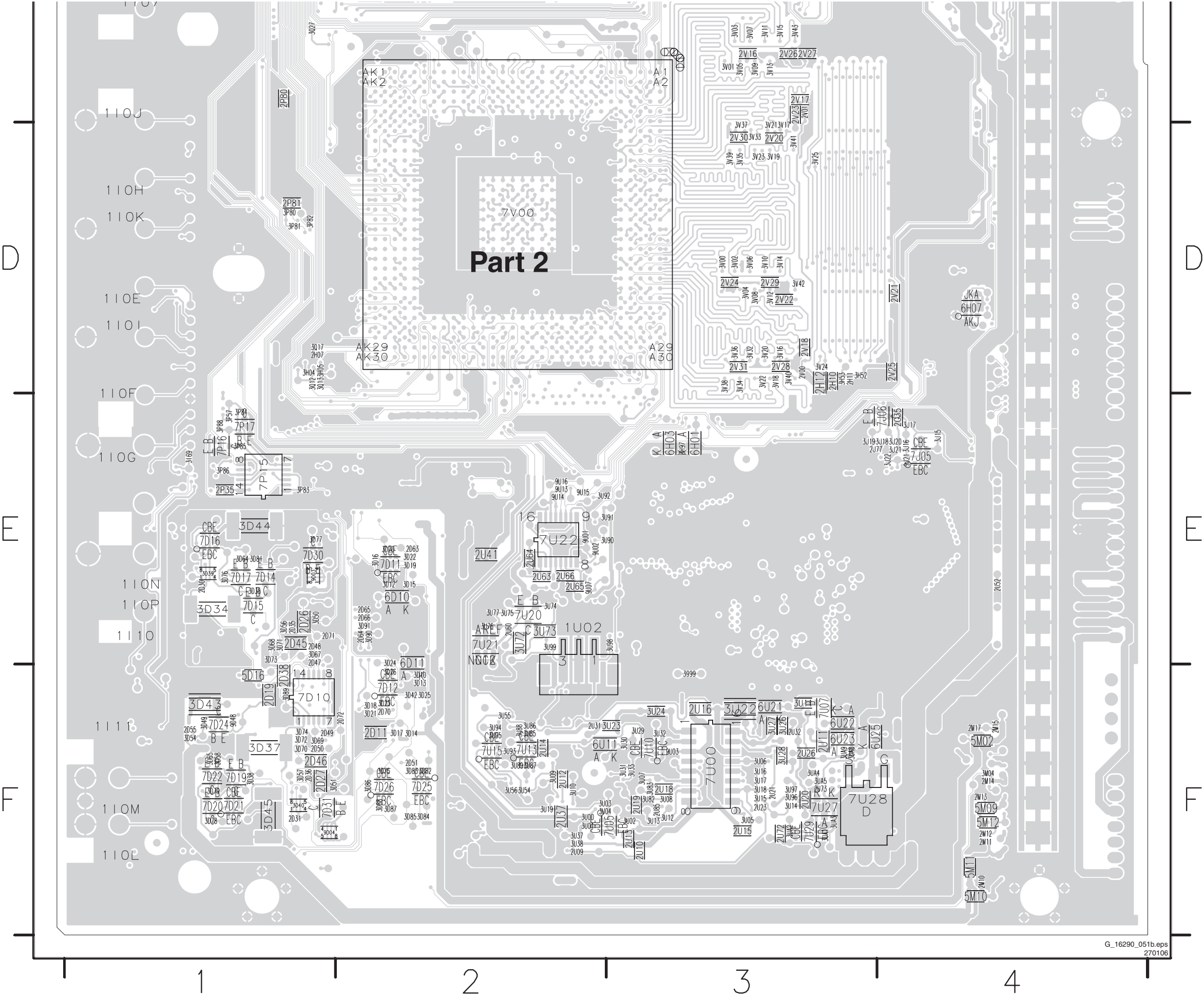


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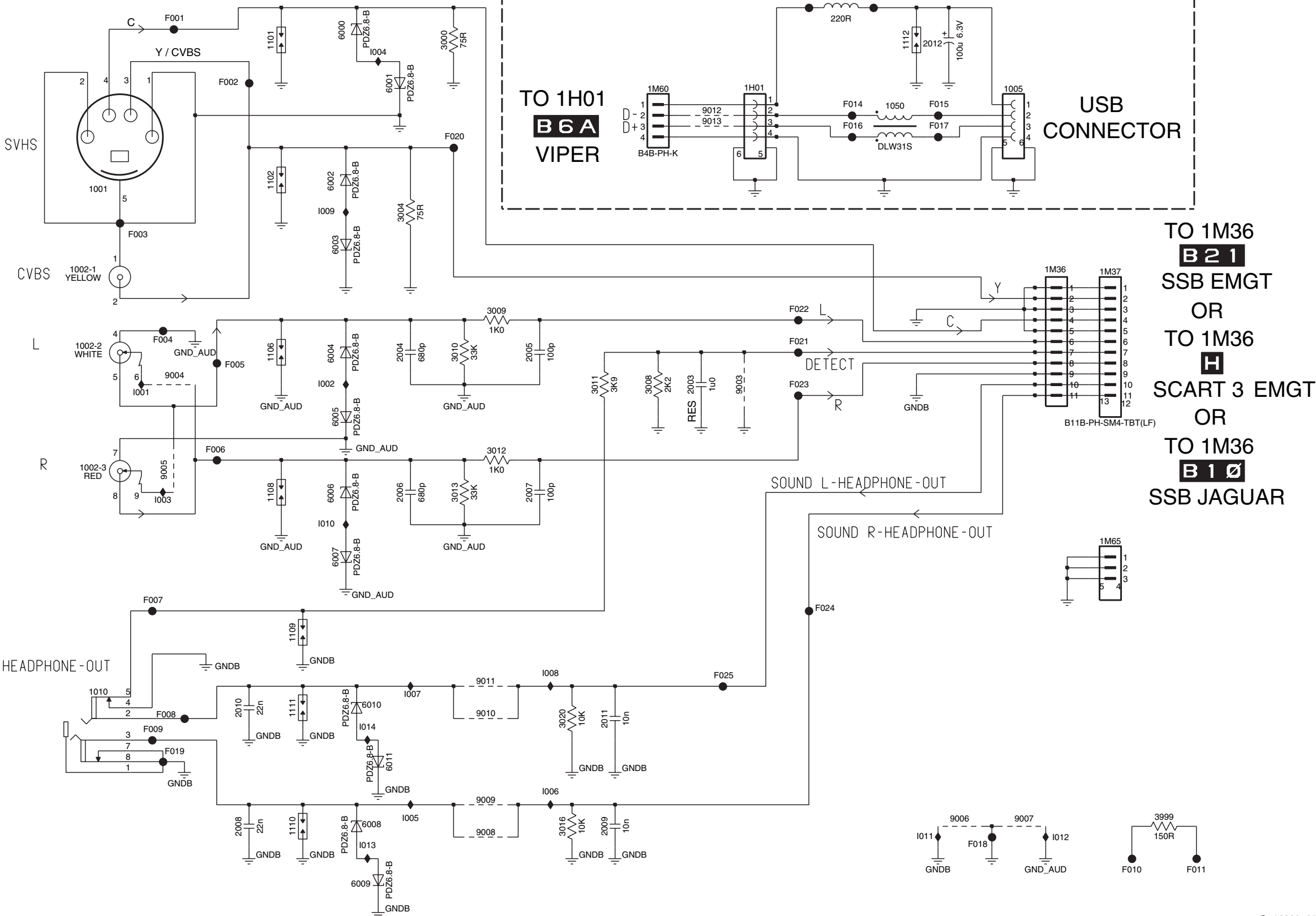
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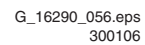
Side I/O Panel: (42" & 50")

D SIDE I/O (37", 42", & 50")

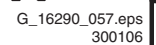
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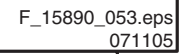
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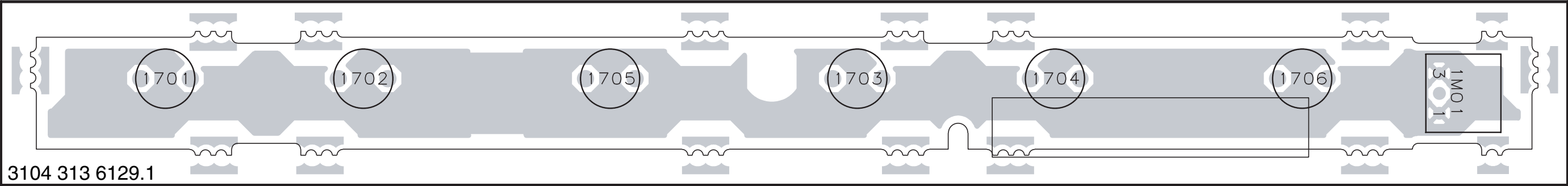


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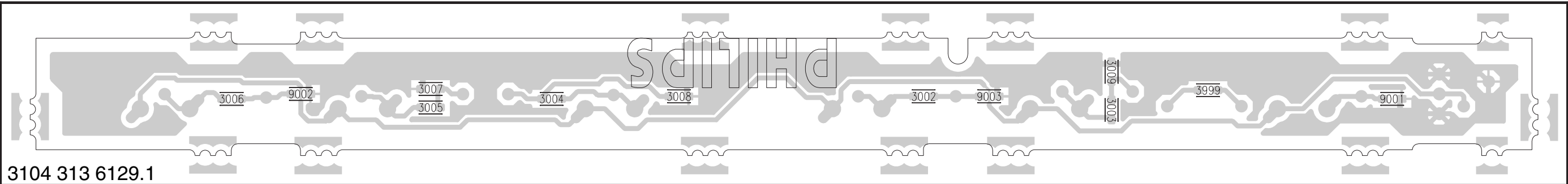
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Layout Control Panel (42" & 50") (Top Side)



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071105

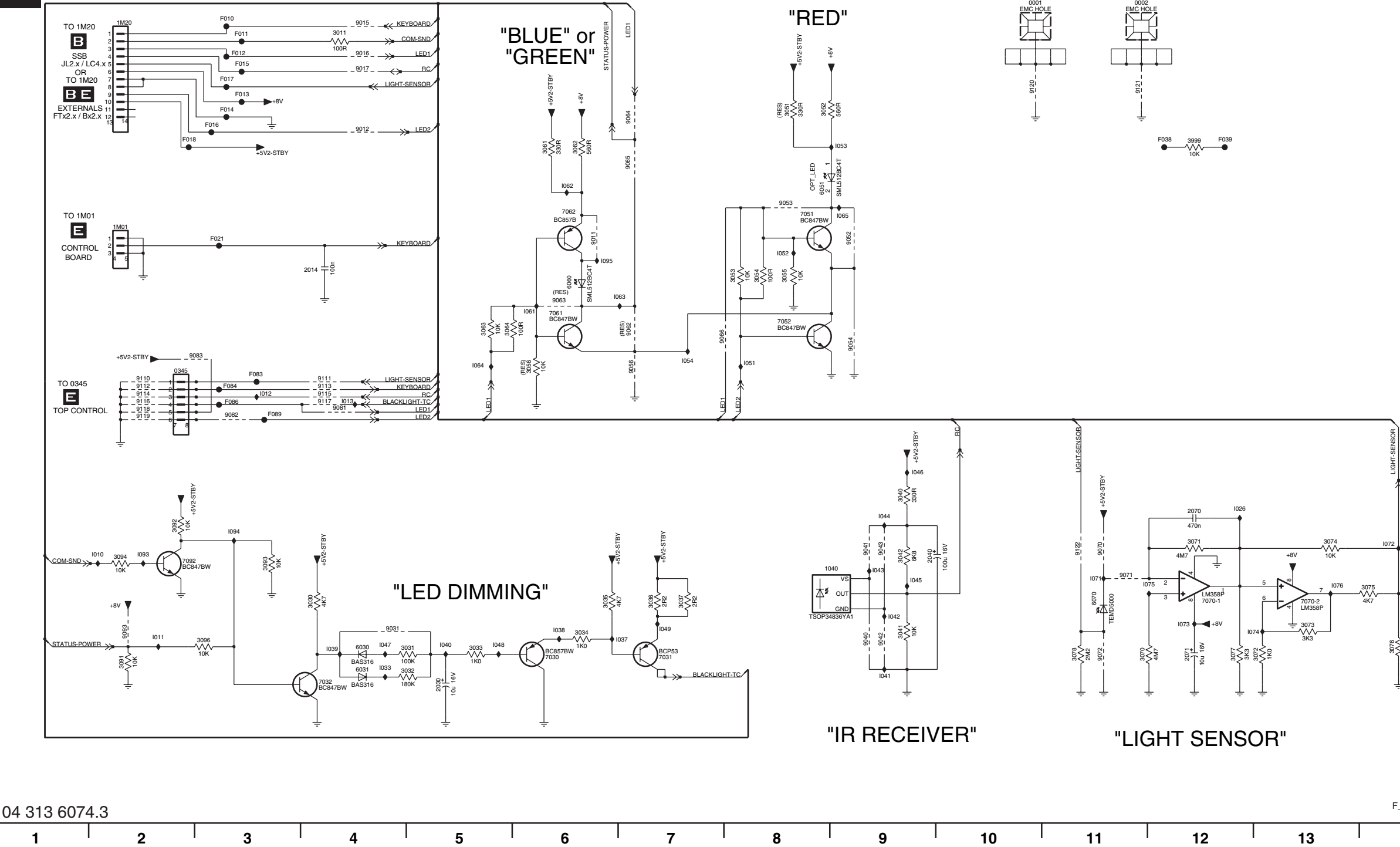
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LED Panel (42" ME5FL)

J LED PANEL



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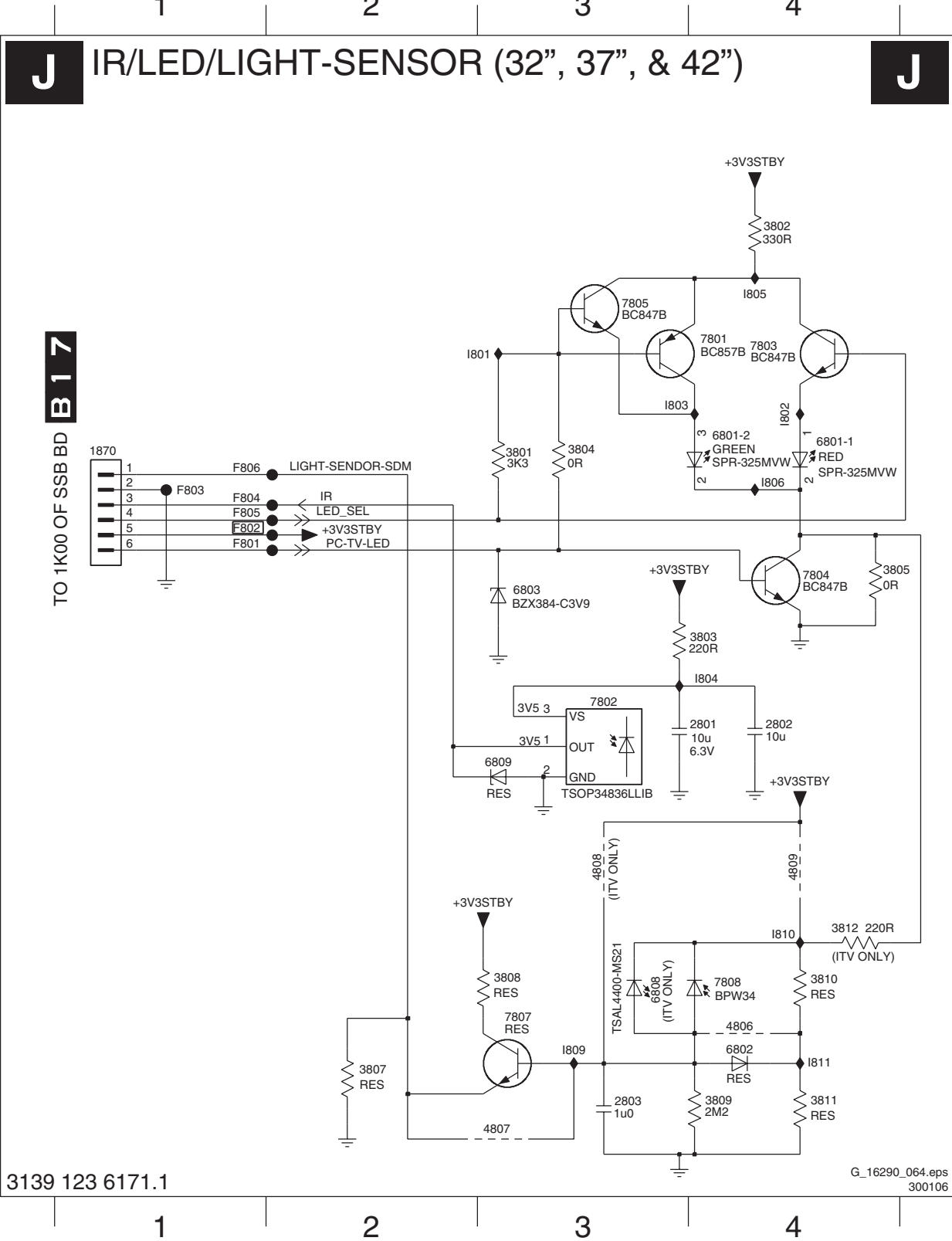
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1M20 A2	F011 A3
2014 C4	F012 A3
2030 G5	F013 B3
2040 F9	F014 B3
2070 F12	F015 A3
2071 G12	F016 B3
3011 A4	F017 B3
3030 G4	F018 B2
3031 G5	F021 C3
3032 G5	F038 B12
3033 G5	F039 B12
3034 G6	F083 D3
3035 G6	F084 D3
3036 G7	F086 E3
3037 G7	F089 E3
3040 F9	I010 F2
3041 G9	I011 G2
3042 F9	I012 E3
3051 B8	I013 E4
3052 B8	I026 F12
3053 C8	I033 G4
3054 C8	I037 G7
3055 C8	I038 G6
3056 D6	I039 G4
3061 B6	I040 G5
3062 B6	I041 G9
3063 D5	I042 G9
3064 D5	I043 F9
3070 G11	I044 F9
3071 F12	I045 F9
3072 G13	I046 E9
3073 G13	I047 G4
3074 F13	I048 G5
3075 F14	I049 G7
3076 G14	I051 D8
3077 G12	I052 C8
3078 G11	I053 B9
3091 G2	I054 D7
3092 F2	I061 D6
3093 F3	I062 C6
3094 F2	I063 D7
3096 G3	I064 D5
3999 B12	I065 C9
6030 G4	I071 F11
6031 G4	I072 F14
6051 C8	I073 G12
6060 C6	I074 G12
6070 G11	I075 F12
7030 G6	I076 F13
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Personal Notes:

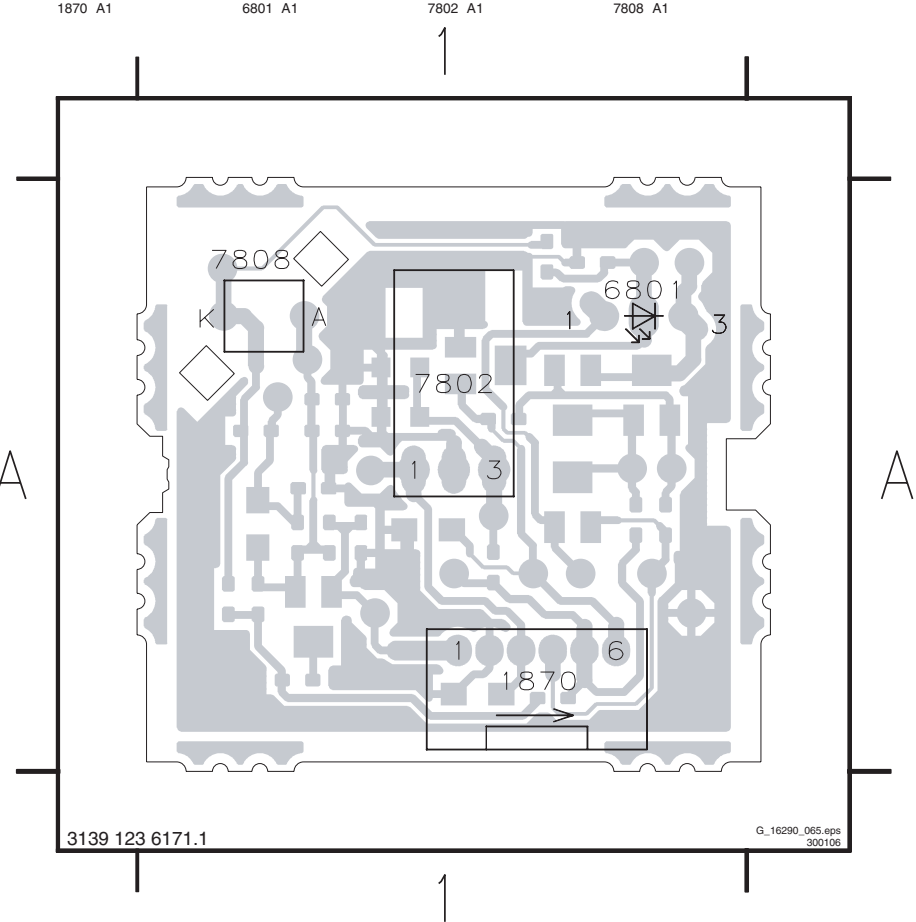
This image shows a full page of blank white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. In the bottom right corner, there is small black text that reads "E_06532_012.eps" and "131004".

Front IR / LED Panel (42" & 50" ME6)

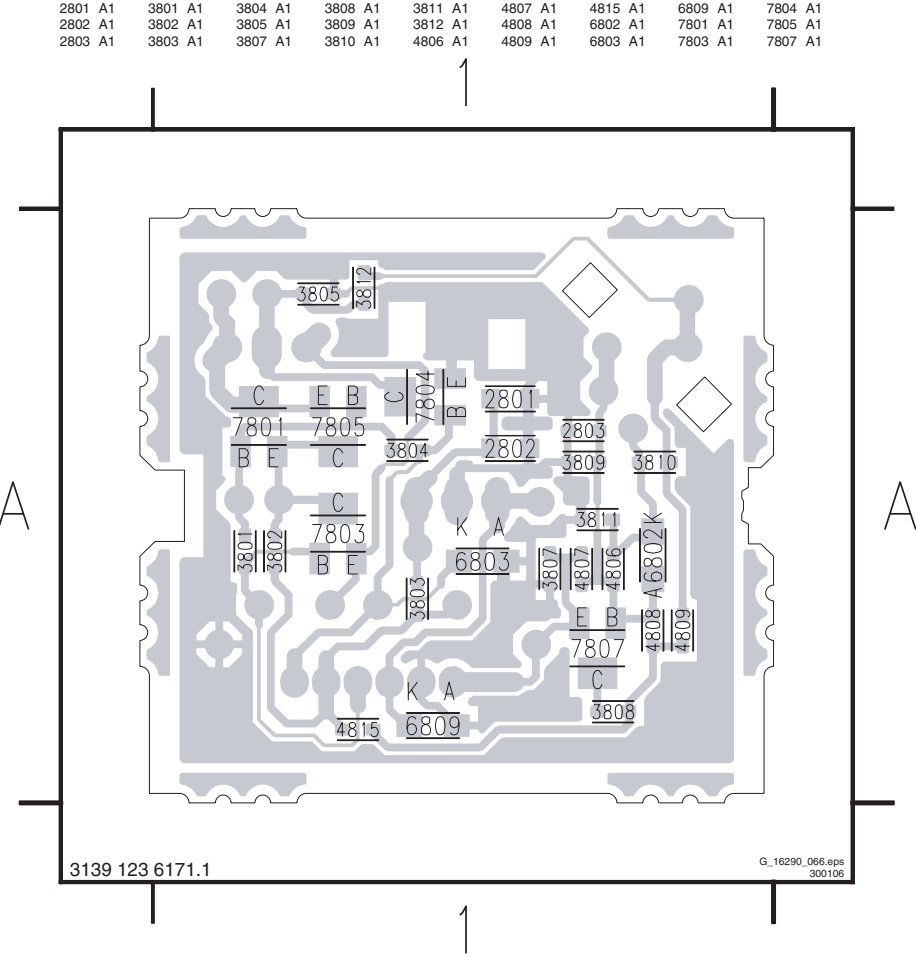
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3801 B3	3807 E2	3812 D4	6801-1 B4	7801 B4	7807 E3	F804 B1	I803 B3	I810 E4	



Layout Front IR / LED Panel (42" & 50" ME6) (Top Side)



Layout Front IR / LED Panel (42" & 50" ME6) (Bottom Side)



8. Alignments

Index of this chapter:

- 8.1 General Alignment Conditions
- 8.2 Hardware Alignments
- 8.3 Software Alignments
- 8.4 Option Settings

8.1 General Alignment Conditions

8.1.1 Start Conditions

Perform all electrical adjustments under the following conditions:

- Power supply voltage: 120 V_{AC} / 60 Hz (± 10%).
 - Connect the set to the AC Power via an isolation transformer with low internal resistance.
 - Allow the set to warm up for approximately 15 minutes.
 - Measure voltages and waveforms in relation to chassis ground (with the exception of the voltages on the primary side of the power supply).
- Caution:** It is not allowed to use heatsinks as ground.
- Test probe: R_i > 10 Mohm, C_i < 20 pF.
 - Use an isolated trimmer/screwdriver to perform alignments.

8.1.2 Initial Settings

Perform all electrical adjustments with the following initial settings (via the "Active Control" button on the RC):

1. To avoid the working of the lightsensor, set ACTIVE CONTROL to OFF.
2. Set SMART PICTURE to NATURAL/ECO.

8.1.3 Alignment Sequence

- First, set the correct options:
 - In SAM, select (SERVICE) OPTIONS -> OPT. NO,
 - Fill in the option settings according to the set sticker (see also paragraph "Option Settings"),
 - Select STORE OPTIONS and push OK on the remote control,
 - After storing, the set must be restarted!
- Warming up (>10 minutes).
- White point alignment.

8.2 Hardware Alignments

For the specific PDP screen alignments, see the

8.3 Software Alignments

Put the set in SAM mode (see the "Service Modes, Error Codes and Fault Finding" section). The SAM menu will now appear on the screen. Select ALIGNMENTS and go to one of the sub menus. The alignments are explained below.

Notes:

- All changes must be stored manually.
- If an empty EAROM (permanent memory) is detected, all settings are set to pre-programmed default values.

8.3.1 General

For the next alignments, supply the following test signals via a video generator to the RF input: NTSC M/N TV-signal with a signal strength of at least 1 mV and a frequency of 61.25 MHz (channel 3).

Tuner AGC

Purpose: To keep the tuner output signal constant as the input signal amplitude varies.

For this chassis, no alignment is necessary, as the AGC alignment is done automatically (standard value: "32").

8.3.2 White Point

- Set ACTIVE CONTROL to OFF.
- In the [MENU] -> PICTURE user menu, set:
 - DYNAMIC CONTRAST to OFF.
 - COLOUR ENHANCEMENT to OFF.
 - COLOUR to "0".
 - CONTRAST to "100".
 - BRIGHTNESS to "50".
- Go to the SAM and select ALIGNMENTS -> WHITE POINT.

Method 1 (with color analyzer):

- Use a 100% white screen as input signal and set the following values:
 - COLOR TEMPERATURE: "Tint to be aligned".
 - All WHITE POINT values to: "127".
 - RED BL OFFSET value to: "9".
 - GREEN BL OFFSET value to: "8".
- Measure with a calibrated (phosphor- independent) color analyzer in the centre of the screen. Consequently, the measurement needs to be done in a dark environment.
- Adjust, by means of decreasing the value of one or two white points, the correct x,y coordinates (see table "White D alignment values"). Tolerance: dx,dy: ± 0.004.
- Repeat this step for the other Color Temperatures that need to be aligned.
- When finished press STORE (in the SAM root menu) to store the aligned values to the NVM.
- Restore the initial picture settings after the alignments.

Table 8-1 White D alignment values

Color Temp. (degr. K)	Cool (11000)	Normal (9100)	Warm (6500)
x	0.276	0.285	0.313
y	0.282	0.293	0.329

When such equipment is not available, use "method 2".

Method 2 (without color analyzer):

If you do not have a color analyzer, you can use the default values. This is the next best solution. The default values are average values coming from production (statistics).

1. Select a COLOUR TEMPERATURE (e.g. COOL, NORMAL, or WARM).
2. Set the RED, GREEN and BLUE default values according to the values in the "Tint settings" table.
3. When finished press STORE (in the SAM root menu) to store the aligned values to the NVM.
4. Restore the initial picture settings after the alignments.

Table 8-2 Tint settings

Colour Temp.	R	G	B
Cool	125	120	91
Normal	127	121	74
Warm	124	78	35

8.4 Option Settings

8.4.1 Introduction

The microprocessor communicates with a large number of I²C ICs in the set. To ensure good communication and to make digital diagnosis possible, the microprocessor has to know

which ICs to address. The presence / absence of these specific ICs (or functions) is made known via the option codes.

Notes:

- After changing the option(s), save them via "STORE".
- The new option setting is only active after the TV is switched "off" and "on" again with the Mains switch (the EAROM is then read again).

8.4.2 Dealer Options

Table 8-3 Dealer options

Menu item	Subjects	Options	Description
Personal Options	Picture Mute	On	Picture mute active in case no picture detected
		Off	Noise in case of no picture detected
	Virgin Mode	On	TV starts up (once) with a language selection menu after the Mains switch is turned "on" for the first time (virgin mode)
		Off	TV does not start up (once) with a language selection menu after the Mains switch is turned "on" for the first time (virgin mode)
	2CS Korea (only for AP region)	On	
		Off	

8.4.3 (Service) Options

Select the sub menu's to set the initialization codes (options).

Table 8-4 Service options

Menu-item	Subjects	Options	Description
PIP/DS	Dual Screen	None / 1 tuner / 2 tuners	no DS / DS with one tuner / DS with two tuners
Data	EPG	On / Off	Feature present / not present
	RRT	Yes / No	Parental control is enabled via the Regional Rating Table (RRT)
Display	Screen	"Value"	Used screen size, type, and resolution (see table "Display code overview" in chapter "Service Modes" for the values)
	Scanning Backlight	On / Off	Feature present / not present
	Dimming Backlight	On / Off	Feature present / not present
Video Repro	Picture Processing	Spider / No Spider	Feature present / not present
	Combfilter	None / 2D / 3D	Only selectable with Columbus in set: No/without RAM/with RAM
	Ambient Light	None / Mono / Stereo	Inverter not present / two inverters mono / two inverters stereo
	MOP	On / Off	Feature present / not present (for sets with AmbiLight this is "on")
Source Selection	HDMI 1	None / Audio / No Audio	No HDMI / HDMI with analog audio / HDMI without analog audio
	HDMI 2	None / Audio / No Audio	No HDMI / HDMI with analog audio / HDMI without analog audio
	USB version	None / 1.1 / 2.0 + CR	No USB / USB 1.1 in side I/O panel / USB 2.0 in cardreader panel
	IEEE1394	Yes / No	Connector present / not present
	Ethernet	Yes / No	Connector present / not present
	S/PDIF inputs	None / 1 conn. / 2 conn.	None / 1 connector present (in) / 2 connectors present (in/out)
Audio Repro	Subw. Internal Present	Yes / No	Internal sub woofer present / not present
	Acoustic System (Cabinet design, used for setting dynamic audio parameters).	None	n.a.
		Entry ME5 15W	e.g. 32/32PF7320A
		(Soft) Wrap	n.a.
		Top	e.g. 42PF9830A
		Entry+	e.g. 32PF9630A, 42PF9730A
		Eco ME5 5W	e.g. 26PF5321D
		Eco ME5 15W	e.g. 32/37/42PF5321D
		Eco ME6 5W	e.g.
		Others	n.a.
Miscellaneous	Alternative Tuner	Philips / Alps	Tuner brand
	Tuner Type	TD1336S	Tuner type
Opt. no.	Group 1		xxxxx xxxxx xxxxx xxxxx (see set sticker)
	Group 2		xxxxx xxxxx xxxxx xxxxx (see set sticker)

8.4.4 Opt. No. (Option numbers)

Select this sub menu to set all options at once (expressed in two long strings of numbers).

An option number (or "option byte") represents a number of different options. When you change these numbers directly, you can set all options very quickly. All options are controlled via eight option numbers.

When the EAROM is replaced, all options will require resetting. To be certain that the factory settings are reproduced exactly, you must set both option number lines. You can find the correct option numbers on a sticker inside the TV set.

Example: The options sticker gives the following option numbers (depending on the model):

- 00016 00006 00033 14979
- 01035 00000 04768 00000

The first line (group 1) indicates hardware options 1 to 4, the second line (group 2) indicates software options 5 to 8.

Every 5-digit number represents 16 bits (so the maximum value will be 65536 if all options are set).

When all the correct options are set, the sum of the decimal values of each Option Byte (OB) will give the option number.

Table 8-5 Option code overview

Byte	Bit (dec. value)	Subject	Options	Settings (in decimal values)	Remarks
1	0 (1)	Video Repro	Picture Processing	0= No Spider, 1= Spider	Spider availability, influences, digital options.
	1 (2)				
	2 (4)				
	3 (8)		Comb Filter	0= None, 8= 2D Comb (Columbus without DRAM), 16= 3D Comb (Columbus with DRAM)	
	4 (16)				
	5 (32)		Ambient Light	0= None, 32=Ambi-light Stereo, 64= Ambi-light Mono	
	6 (64)				
	7 (128)		Dual Screen	0= None, 256= One Tuner DS, 512= Two Tuner DS	
	8 (256)				
	9 (512)		MOP	0= Off, 1024= On	Matrix Output Processor (or EBILD)
	10 (1024)				
	11 (2048)		JOP	0= Off, 2048= On	Jaguar Output Processor (or EBILD) Reserved for future use
	12 (4096)		POD	0= Off, 4096= On	
	13 (8192)		n.a.		
	14 (16384)		n.a.		
	15 (32768)		n.a.		
2	0 (1)	Sound Repro	Acoustic System (Cabinet)	0= None, 1= Entry_ME5_5W, 2= Entry_ME5_15W, 3= (Soft)Wrap, 4= Top, 5= Entry+, 15= Others	Cabinet design, used for setting dynamic audio parameters.
	1 (2)				
	2 (4)				
	3 (8)		Aux Headphone Sound	0= Off, 16= On	Dual AC3 sound in Aux available.
	4 (16)				
	5 (32)		n.a.		
	6 (64)		n.a.		
	7 (128)		n.a.		
	8 (256)		n.a.		
	9 (512)		Sub woofer Internal	0= Not Present, 512= Present	
	10 (1024)		Centre Mode Support	0= Not Supported, 1024= Supported	
	11 (2048)		n.a.		
	12 (4096)		n.a.		
	13 (8192)		n.a.		
	14 (16384)		n.a.		
	15 (32768)		n.a.		
3	0 (1)	Source Select	HDMI1	0= None, 1= With analog audio, 2= Without analog audio	
	1 (2)		HDMI2	0= None, 4= With analog audio, 8= Without analog audio	
	2 (4)				
	3 (8)		n.a.		
	4 (16)				
	5 (32)		USB Version	0= None, 32= USB 1.1, 64= USB 2.0 + Card reader	USB support.
	6 (64)		IEEE1394	0= Not Present, 128= Present	
	7 (128)				
	8 (256)		Ethernet	0= LAN not present, 256= LAN present	
	9 (512)		RRT	0= Off, 512= On	Regional Rating Table (RRT)
	10 (1024)		S/PDIF Inputs	0= None, 1024= 1 Connector, 2048= 2 Connectors	
	11 (2048)		LCOS I/O	0= Not Present, 4096= Present	
	12 (4096)				
	13 (8192)		n.a.		
	14 (16384)		n.a.		
	15 (32768)		n.a.		
4	0 (1)	Region	Region	0= EU, 1= AP-P, 2= AP-N, 3= US, 4= Latam	
	1 (2)				
	2 (4)				
	3 (8)	Interconnect	China IF	0= Off, 8= On	
	4 (16)		Alternative Tuner	0= Philips, 16= Alps	Tuner make.
	5 (32)		Tuner Type	0= TD1336s (B-Chassis US), 32= TD1331(J-Chassis US), 64= UV1318 (Analogue EU), 96= TD1316 (Hybrid EU)	Tuner type (B-chassis US is e.g "BP2.3U").
	6 (64)				
	7 (128)	Source Select	n.a.		
	8 (256)		AV1	0= CVBS/RGB, 256= CVBS/YC/LR, 512= CVBS/YC/YPbPr/HV/LR	Input type.
	9 (512)		AV2	0= CVBS/YC/RGB/P50, 1024= CVBS/YC/LR	Input type.
	10 (1024)				
	11 (2048)		AV3	0= Not Available, 4096= CVBS, 8192= YPbPr	Input type.
	12 (4096)				
	13 (8192)		AV4	0= Not Available, 16384= YPbPr	Input type.
	14 (16384)				
	15 (32768)				

Byte	Bit (dec. value)	Subject	Options	Settings (in decimal values)	Remarks
5	0 (1)	Display	Screen	See table "Display code overview" in chapter "Service Modes" for the values.	Screen size, type, and resolution.
	1 (2)				
	2 (4)				
	3 (8)				
	4 (16)				
	5 (32)				
	6 (64)				
	7 (128)				
	8 (256)		n.a.		
	9 (512)		n.a.		
	10 (1024)		Dimming Backlight	0= Off, 1024= On	
	11 (2048)		Scanning Backlight	0= Off, 2048= On	
	12 (4096)		n.a.		
	13 (8192)		n.a.		
	14 (16384)		n.a.		
	15 (32768)		n.a.		
6	0 (1)	Miscellaneous	Monitor	0= Off, 2= On	Reserved for future use
	1 (2)		n.a.		
	2 (4)		Stand Alone	0= Off, 4= On	Reserved for future use
	3 (8)		n.a.		
	4 (16)		n.a.		
	5 (32)		n.a.		
	6 (64)		Proximity Sensor	0= Off, 64= On	
	7 (128)		n.a.		
	8 (256)		Touch Pad	0= Off, 256= On	Reserved for future use
	9 (512)		n.a.		
	10 (1024)		n.a.		
	11 (2048)		n.a.		
	12 (4096)		n.a.		
	13 (8192)		n.a.		
	14 (16384)		n.a.		
	15 (32768)		n.a.		
7	0 (1)	Personal	Self Learning TV	0= Off, 1= On	Reserved for future use
	1 (2)		Auto Store Mode	0= None, 2= PDC/VPS, 4= TXT Page, 6= PDC/VPS/TXT Page	Fixed to: "None" in the AP-N and US versions.
	2 (4)				
	3 (8)		2CS Korea	0= Off, 8= On, 16= Auto	
	4 (16)				
	5 (32)		Picture Mute	0= Off, 32= On	
	6 (64)		n.a.		
	7 (128)		Virgin Mode	0= Off, 128= On	
	8 (256)		Hotel Mode	0= Off, 256= On	
	9 (512)		Content Browser	0= Not Present, 512= Present	
	10 (1024)		Connected Planet	0= Off, 1024= Full Connected Planet + logo support	
	11 (2048)				
	12 (4096)		n.a.		
	13 (8192)		EPG	0= None, 8192= TXT Guide only, 16384= NextView 2C3, 24576 = NextView 2	
	14 (16384)				
	15 (32768)		TV Guide USA (Gemstar)	0= Off, 32768= On	
8	0 (1)	n.a.	n.a.		
	1 (2)	n.a.	n.a.		
	2 (4)	n.a.	n.a.		
	3 (8)	n.a.	n.a.		
	4 (16)	n.a.	n.a.		
	5 (32)	n.a.	n.a.		
	6 (64)	n.a.	n.a.		
	7 (128)	n.a.	n.a.		
	8 (256)	n.a.	n.a.		
	9 (512)	n.a.	n.a.		
	10 (1024)	n.a.	n.a.		
	11 (2048)	n.a.	n.a.		
	12 (4096)	n.a.	n.a.		
	13 (8192)	n.a.	n.a.		
	14 (16384)	n.a.	n.a.		
	15 (32768)	n.a.	n.a.		

9. Circuit Descriptions, Abbreviation List, and IC Data Sheets

Index of this chapter:

- 9.1 Introduction
- 9.2 Abbreviation List
- 9.3 IC Data Sheets

Notes:

- Only new circuits (circuits that are not published recently) are described. For other descriptions see the BP2.xU manual (3122 785 15540).
- Figures can deviate slightly from the actual situation, due to different set executions.
- For a good understanding of the following circuit descriptions, please use the wiring, block (chapter 6) and circuit diagrams (chapter 7). Where necessary, you will find a separate drawing for clarification.

9.1 Introduction

This chassis is specifically developed for ATSC reception without CableCARD™, and is in fact derived from the BL2.xU/BP2.xU chassis. The key components are:

- MPIF (PNX3000).
- AVIP/COLUMBUS (PNX2015).
- VIPER 2 (PNX8550).

Some delta's with respect to the BL2.xU/BP2.xU chassis:

- No POD, so only unscrambled ATSC channels.
- Audio Amplifier is integrated on the SSB.
- I/O's are integrated on the SSB.
- One HDMI connector (i.o. two).
- One USB1.1 connector (i.o. USB2.0).
- No card reader.
- No MOP (EPLD), due to the fact that these sets do not come with AmbiLight.

9.1.1 Features

The main features for this chassis are:

- The move from the analog world to the digital world. W.o.w. from signal processing via "hardware circuits" to signal processing via "software algorithms". This means: no software = no picture and sound!
- Fit for both analog and digital signal processing, this by converting analog signals into digital transport streams and allowing seamless zapping between all possible signal sources. This makes the chassis applicable for e.g. receiving ATSC in an integrated product form.
- The internal digital processing allows new "Multi-Media" applications such as Content Browser, Memory Card Slot, Local Area Network support and all kinds of streaming applications.
- The chassis can be upgraded in the future with internal functionality such as Personal Video Recording, DVD/RW.

9.1.2 Chassis Block Diagram

Description below refers to the block diagrams in chapter 6 "Block Diagrams, Test Point Overview, and Waveforms".

Analog Reception

The TV receives multimedia information by tuning the Hybrid tuner (for analog and digital reception) to one of many 6 MHz input channels available via a cable connection. When the input channel is an analog channel, the signal is processed via the NTSC decoder and the VBI data decoder of the MPIF.

Digital Reception

The TV receives multimedia information by tuning to one of many 6 MHz input channels available via a cable connection.

When the input channel is a digital channel, it is processed via the QAM demodulator and then passed to the multi-media processor (VIPER), which handles the synchronization and display of audio-visual material.

Signal Processing

The AVIP together with the MPIF device is used to perform the input decoding of a single stream of analog audio and video broadcast signals. In addition, the AVIP is used for decoding and presentation of audio output streams. The main data connection between MPIF and AVIP is done via an I²D bus. The AVIP converts the incoming video data to ITU-656 format for communication to the VIPER IC.

The audio data is transferred between the AVIP and VIPER using I²S.

The AVIP IC is controlled by the VIPER via the I²C bus.

The key part in the system, the VIPER, performs almost all key features, like video quality enhancement, motion compensation, picture-in-picture processing, and others. It is a completely digital IC with a TriMedia DSP (Digital Signal Processor) core and a MIPS microcontroller core. The DSP and some additional cores are used to do the video feature processing and some auxiliary sound feature processing. The MIPS microcontroller core is used for all internal and external controlling tasks including a system wide I²C bus.

The VIPER provides a primary digital (YUV or RGB) output to the LVDS transmitter.

SSB Cell Layout

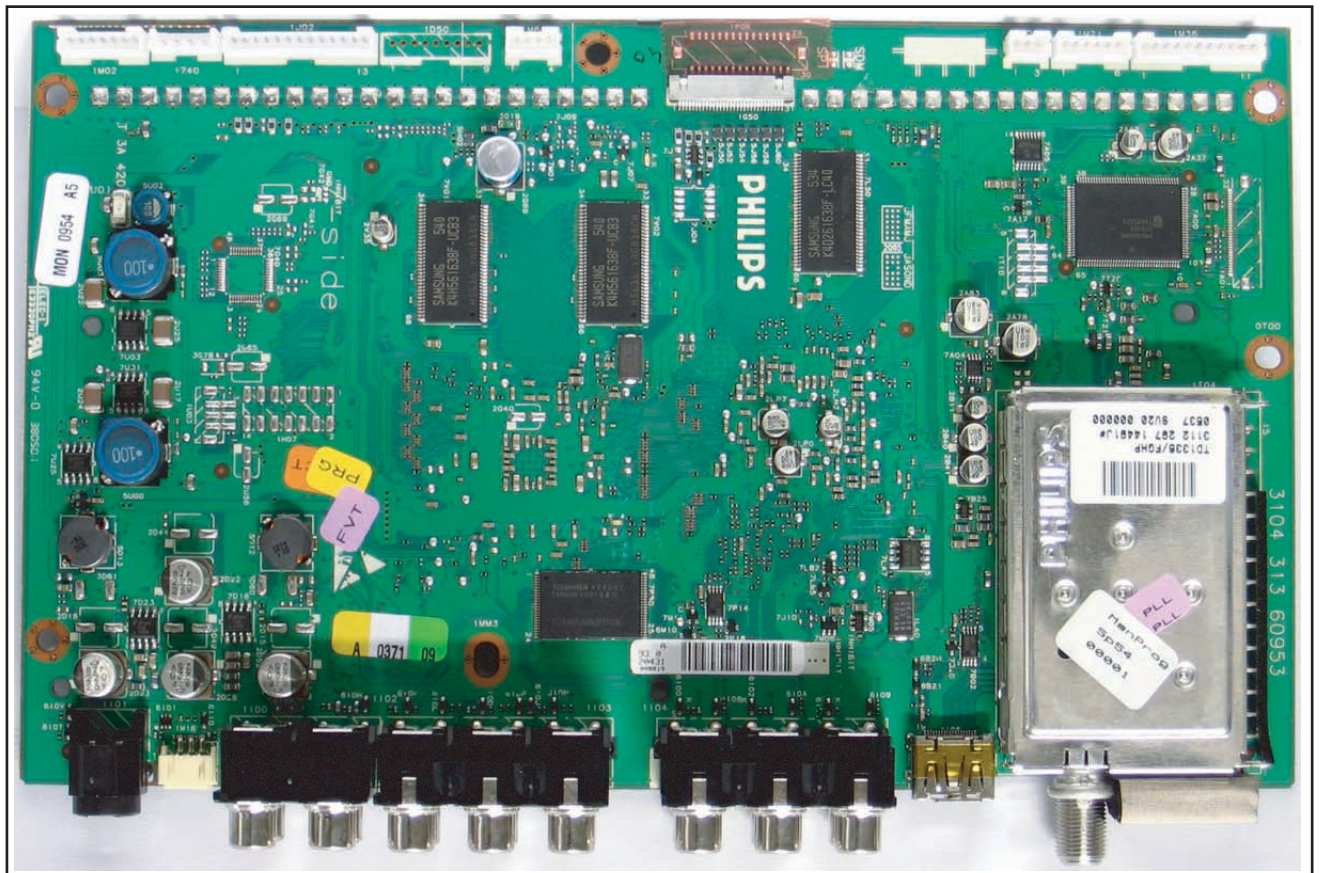


Figure 9-1 SSB top view

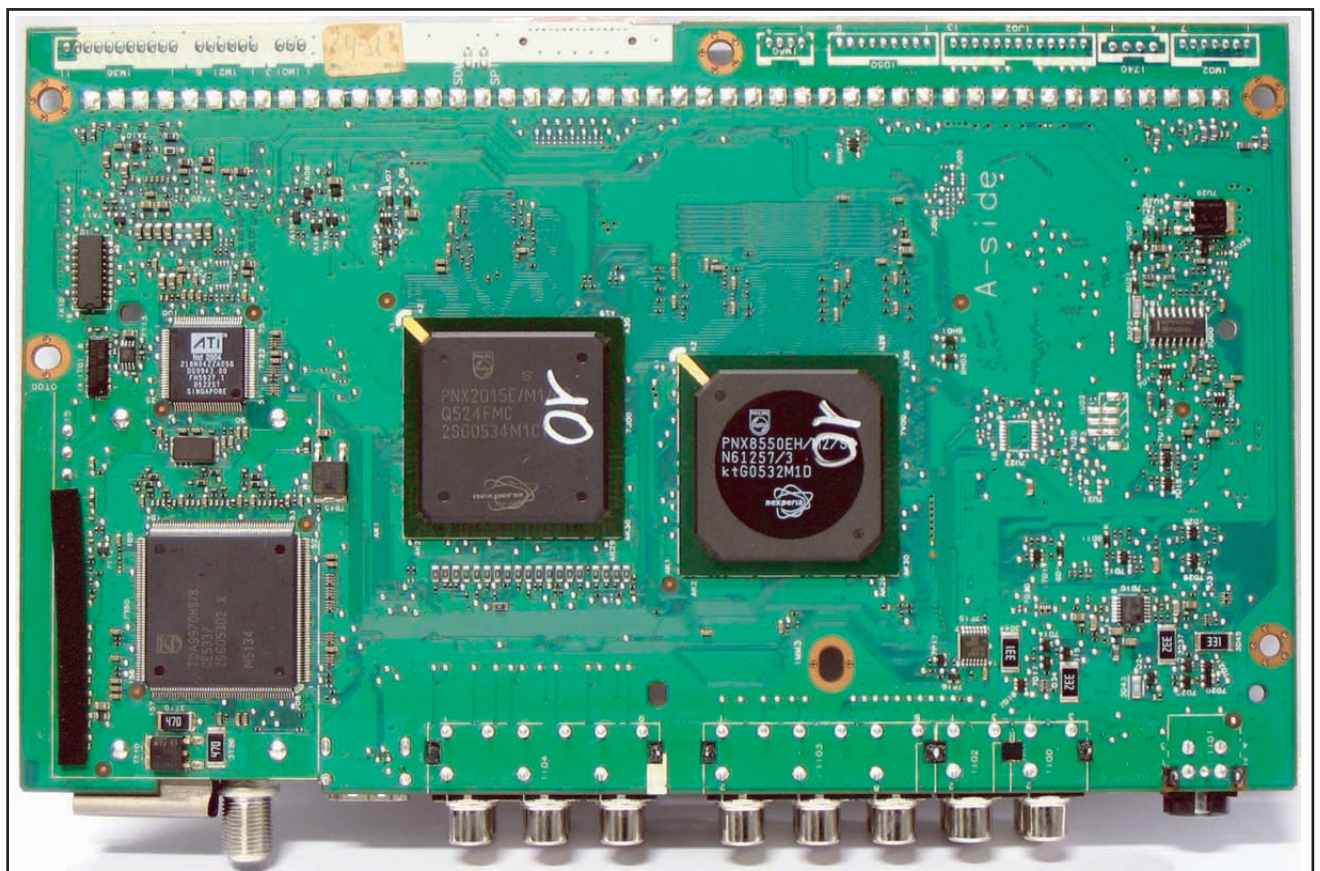


Figure 9-2 SSB bottom view

9.2 Abbreviation List

0/6/12	SCART switch control signal on A/V board. 0 = loop through (AUX to TV), 6 = play 16:9 format, 12 = play 4:3 format	CVBS	Composite Video Blanking and Synchronization
2DNR	Spatial (2D) Noise Reduction	DAC	Digital to Analogue Converter
3DNR	Temporal (3D) Noise Reduction	DBE	Dynamic Bass Enhancement: extra low frequency amplification
AARA	Automatic Aspect Ratio Adaptation: algorithm that adapts aspect ratio to remove horizontal black bars; keeps the original aspect ratio	DDC	See "E-DDC"
ACI	Automatic Channel Installation: algorithm that installs TV channels directly from a cable network by means of a predefined TXT page	D/K	Monochrome TV system. Sound carrier distance is 6.5 MHz
ADC	Analogue to Digital Converter	DFU	Directions For Use: owner's manual
AFC	Automatic Frequency Control: control signal used to tune to the correct frequency	DMR	Digital Media Reader: card reader
AGC	Automatic Gain Control: algorithm that controls the video input of the feature box	DNR	Digital Noise Reduction: noise reduction feature of the set
AM	Amplitude Modulation	DRAM	Dynamic RAM
ANR	Automatic Noise Reduction: one of the algorithms of Auto TV	DRM	Digital Rights Management
AP	Asia Pacific	DSP	Digital Signal Processing
AR	Aspect Ratio: 4 by 3 or 16 by 9	DST	Dealer Service Tool: special remote control designed for service technicians
ASF	Auto Screen Fit: algorithm that adapts aspect ratio to remove horizontal black bars without discarding video information	DTCP	Digital Transmission Content Protection; A protocol for protecting digital audio/video content that is traversing a high speed serial bus, such as IEEE-1394
ATSC	Advanced Television Systems Committee, the digital TV standard in the USA	DVD	Digital Versatile Disc
ATV	See Auto TV	DVI(-d)	Digital Visual Interface (d= digital only)
Auto TV	A hardware and software control system that measures picture content, and adapts image parameters in a dynamic way	EAS	Emergency Alert Signalling; A cable TV standard (SCTE18) to signal emergency information to digital terminal devices
AV	External Audio Video	ECM	Entitlement Control Message
AVIP	Audio Video Input Processor	E-DDC	Enhanced Display Data Channel (VESA standard for communication channel and display). Using E-DDC, the video source can read the EDID information from the display.
B/G	Monochrome TV system. Sound carrier distance is 5.5 MHz	EDID	Extended Display Identification Data (VESA standard)
BTSC	Broadcast Television Standard Committee. Multiplex FM stereo sound system, originating from the USA and used e.g. in LATAM and AP-NTSC countries	EEPROM	Electrically Erasable and Programmable Read Only Memory
B-TXT	Blue TeleteXT	EMI	Electro Magnetic Interference
C	Centre channel (audio)	EMM	Entitlement Management Message
CA(M)	Conditional Access (Module)	EPLD	Erasable Programmable Logic Device
CEC	Consumer Electronics Control bus: remote control bus on HDMI connections	EU	Europe
CIS	Card Information Structure: Protocol which identifies the card in a POD module	EXT	EXternal (source), entering the set by SCART or by cinches (jacks)
CL	Constant Level: audio output to connect with an external amplifier	FAT	Forward Application Transport channel
COLUMBUS	COlor LUMinance Baseband Universal Sub-system	FBL	Fast BLanking: DC signal accompanying RGB signals
ComPair	Computer aided rePair	FDC	
CP	Connected Planet / Copy Protection	FDS	Full Dual Screen (same as FDW)
CSM	Customer Service Mode	FDW	Full Dual Window (same as FDS)
CSS	Content Scrambling System; An encryption method for MPEG-2 video on DVDs. The algorithm and keys required to decode the disc are stored on the DVD-player	FLASH	FLASH memory
CTI	Color Transient Improvement: manipulates steepness of chroma transients	FM	Field Memory or Frequency Modulation
		FTV	Flat TeleVision
		Gb/s	Giga bits per second
		G-TXT	Green TeleteXT
		H	H_sync to the module
		HD	High Definition
		HDD	Hard Disk Drive
		HDCP	High-bandwidth Digital Content Protection: A "key" encoded into the HDMI/DVI signal that prevents video data piracy. If a source is HDCP coded and connected via HDMI/DVI without the proper HDCP decoding, the picture is put into a "snow vision" mode or changed to a low resolution. For normal content distribution the source and the display device must be enabled for HDCP "software key" decoding.
		HDMI	High Definition Multimedia Interface
		HP	HeadPhone

I	Monochrome TV system. Sound carrier distance is 6.0 MHz	OTC	On screen display Teletext and Control; also called Artistic (SAA5800)
I ² C	Integrated IC bus	P50	Project 50: communication protocol between TV and peripherals
I ² D	Integrated IC Data bus		
I ² S	Integrated IC Sound bus	PAL	Phase Alternating Line. Color system mainly used in West Europe (color carrier= 4.433619 MHz) and South America (color carrier PAL M= 3.575612 MHz and PAL N= 3.582056 MHz)
IB	In Band channel		
IF	Intermediate Frequency		
Interlaced	Scan mode where two fields are used to form one frame. Each field contains half the number of the total amount of lines. The fields are written in "pairs", causing line flicker.	PCB	Printed Circuit Board (same as "PWB")
IR	Infra Red	PCM	Pulse Code Modulation
IRQ	Interrupt Request	PCMCIA	Personal Computer Memory Card International Association
ITU-656	The ITU Radio communication Sector (ITU-R) is a standards body subcommittee of the International Telecommunication Union relating to radio communication. ITU-656 (a.k.a. SDI), is a digitized video format used for broadcast grade video. Uncompressed digital component or digital composite signals can be used. The SDI signal is self-synchronizing, uses 8 bit or 10 bit data words, and has a maximum data rate of 270 Mbit/s, with a minimum bandwidth of 135 MHz.	PDP	Plasma Display Panel
		PFC	Power Factor Corrector (or Pre-conditioner)
		PIP	Picture In Picture
		PLL	Phase Locked Loop. Used for e.g. FST tuning systems. The customer can give directly the desired frequency
		POD	Point Of Deployment: A removable CAM module, implementing the CA system for a host (e.g. a TV-set)
		POR	Power On Reset, signal to reset the uP
ITV	Institutional TeleVision; TV sets for hotels, hospitals etc.	Progressive Scan	Scan mode where all scan lines are displayed in one frame at the same time, creating a double vertical resolution.
JOP	Jaguar Output Processor	PSIP	Program and System Information Protocol: A standard for (broadcast) digital television. PSIP consists of channel mapping data, program guide data, information about closed captions and content advisory ratings, and other data related to the current and future programs.
LS	Last Status; The settings last chosen by the customer and read and stored in RAM or in the NVM. They are called at start-up of the set to configure it according to the customer's preferences		
LATAM	Latin America		
LCD	Liquid Crystal Display	PTC	Positive Temperature Coefficient, non-linear resistor
LED	Light Emitting Diode		
L/L'	Monochrome TV system. Sound carrier distance is 6.5 MHz. L' is Band I, L is all bands except for Band I	PWB	Printed Wiring Board (same as "PCB")
		PWM	Pulse Width Modulation
LORE	LOcal REgression approximation noise reduction	QAM	Quadrature Amplitude Modulation; modulation method
LPL	LG.Philips LCD (supplier)	QTNR	Quality Temporal Noise Reduction
LS	Loudspeaker	QVCP	Quality Video Composition Processor
LVDS	Low Voltage Differential Signalling	RAM	Random Access Memory
Mbps	Mega bits per second	RGB	Red, Green, and Blue. The primary color signals for TV. By mixing levels of R, G, and B, all colors (Y/C) are reproduced.
M/N	Monochrome TV system. Sound carrier distance is 4.5 MHz		
MOP	Matrix Output Processor	RC	Remote Control
MOSFET	Metal Oxide Silicon Field Effect Transistor, switching device	RC5 / RC6	Signal protocol from the remote control receiver
MPEG	Motion Pictures Experts Group	RESET	RESET signal
MPIF	Multi Platform InterFace	ROM	Read Only Memory
MUTE	MUTE Line	R-TXT	Red TeletEXT
NC	Not Connected	RRT	This is one of the PSIP tables received via an ATSC compliant transport stream. In case of the OpenCable compliant transport stream, RRT is received via the out of band SI
NICAM	Near Instantaneous Compounded Audio Multiplexing. This is a digital sound system, mainly used in Europe.		
NTC	Negative Temperature Coefficient, non-linear resistor	SAM	Service Alignment Mode
NTSC	National Television Standard Committee. Color system mainly used in North America and Japan. Color carrier NTSC M/N= 3.579545 MHz, NTSC 4.43= 4.433619 MHz (this is a VCR norm, it is not transmitted off-air)	S/C	Short Circuit
		SCART	Syndicat des Constructeurs d'Appareils Radiorecepteurs et Televisieurs
NVM	Non-Volatile Memory: IC containing TV related data such as alignments	SCL	Serial Clock I ² C
		SCL-F	CLock Signal on Fast I ² C bus
		SD	Standard Definition
		SDA	Serial Data I ² C
O/C	Open Circuit	SDA-F	DAta Signal on Fast I ² C bus
OOB	Out Of Band channel	SDI	Serial Digital Interface, see "ITU-656"
OSD	On Screen Display	SDRAM	Synchronous DRAM

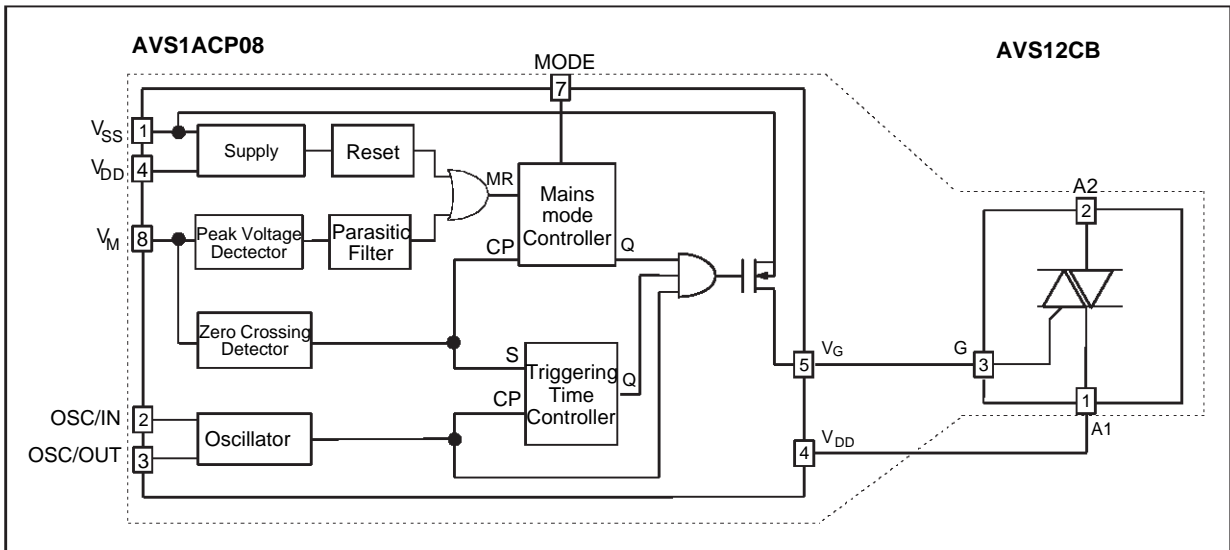
SECAM	SEquence Couleur Avec Memoire. Color system mainly used in France and East Europe. Color carriers= 4.406250 MHz and 4.250000 MHz
SIF	Sound Intermediate Frequency
SMPS	Switched Mode Power Supply
SOG	Sync On Green
SOPS	Self Oscillating Power Supply
S/PDIF	Sony Philips Digital InterFace
SRAM	Static RAM
SSB	Small Signal Board
STBY	STandBY
SOG	Sync On Green
SVGA	800x600 (4:3)
SVHS	Super Video Home System
SW	Software
SWAN	Spatial temporal Weighted Averaging Noise reduction
SXGA	1280x1024
TFT	Thin Film Transistor
THD	Total Harmonic Distortion
TMDs	Transmission Minimized Differential Signalling
TXT	TeleteXT
TXT-DW	Dual Window with TeleteXT
uP	Microprocessor
UXGA	1600x1200 (4:3)
V	V-sync to the module
VCR	Video Cassette Recorder
VESA	Video Electronics Standards Association
VGA	640x480 (4:3)
VL	Variable Level out: processed audio output toward external amplifier
VSb	Vestigial Side Band; modulation method
WYSIWYR	What You See Is What You Record: record selection that follows main picture and sound
WXGA	1280x768 (15:9)
XTAL	Quartz crystal
XGA	1024x768 (4:3)
Y	Luminance signal
Y/C	Luminance (Y) and Chrominance (C) signal
YPbPr	Component video. Luminance and scaled color difference signals (B-Y and R-Y)
YUV	Component video

9.3 IC Data Sheets

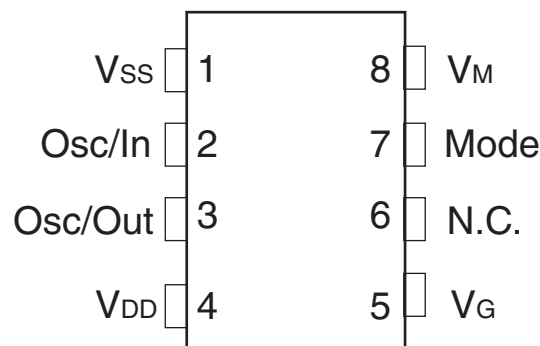
This section shows the internal block diagrams and pin configurations of ICs that are drawn as "black boxes" in the electrical diagrams (with the exception of "memory" and "logic" ICs).

9.3.1 Diagram A3, AVS1ACP08 (IC 7H05)

Block Diagram



Pin Configuration



G_16290_081.eps
020206

Figure 9-3 Internal block diagram and pin configuration

9.3.2 Diagram A4, MC34067P (IC 7U01)

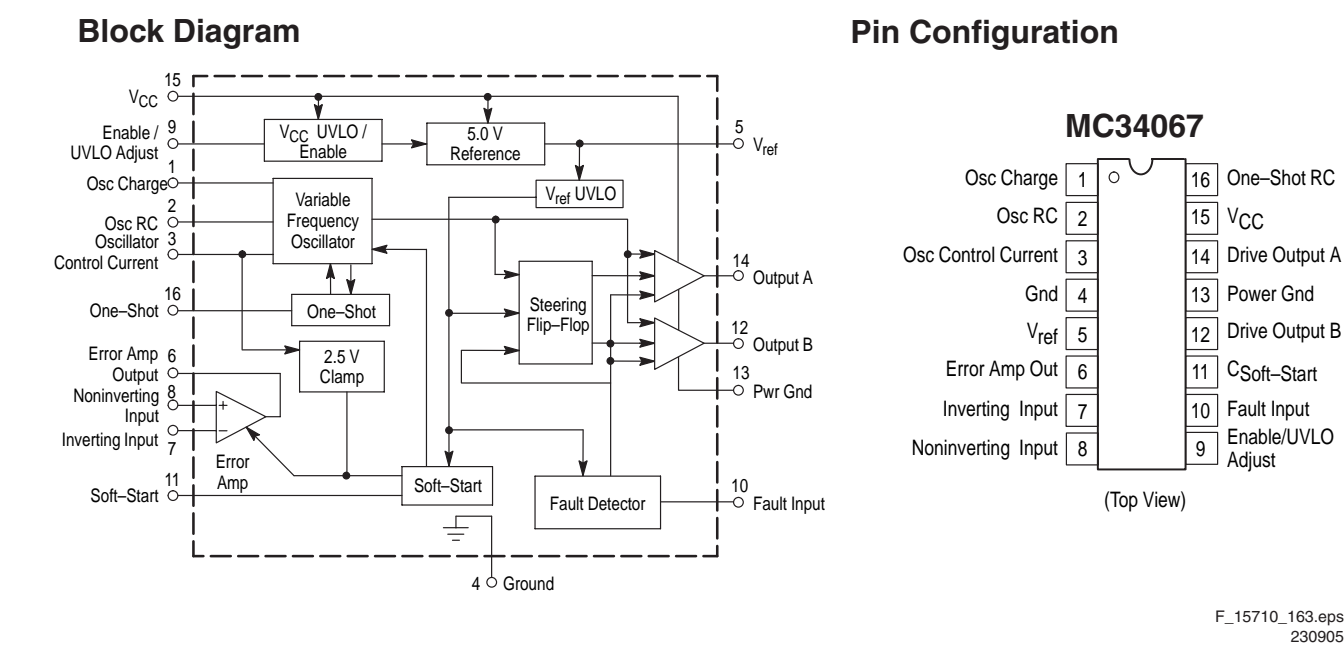


Figure 9-4 Internal block diagram and pin configuration

9.3.3 Diagram B1A, NCP5422ADR2G (IC 7U00)

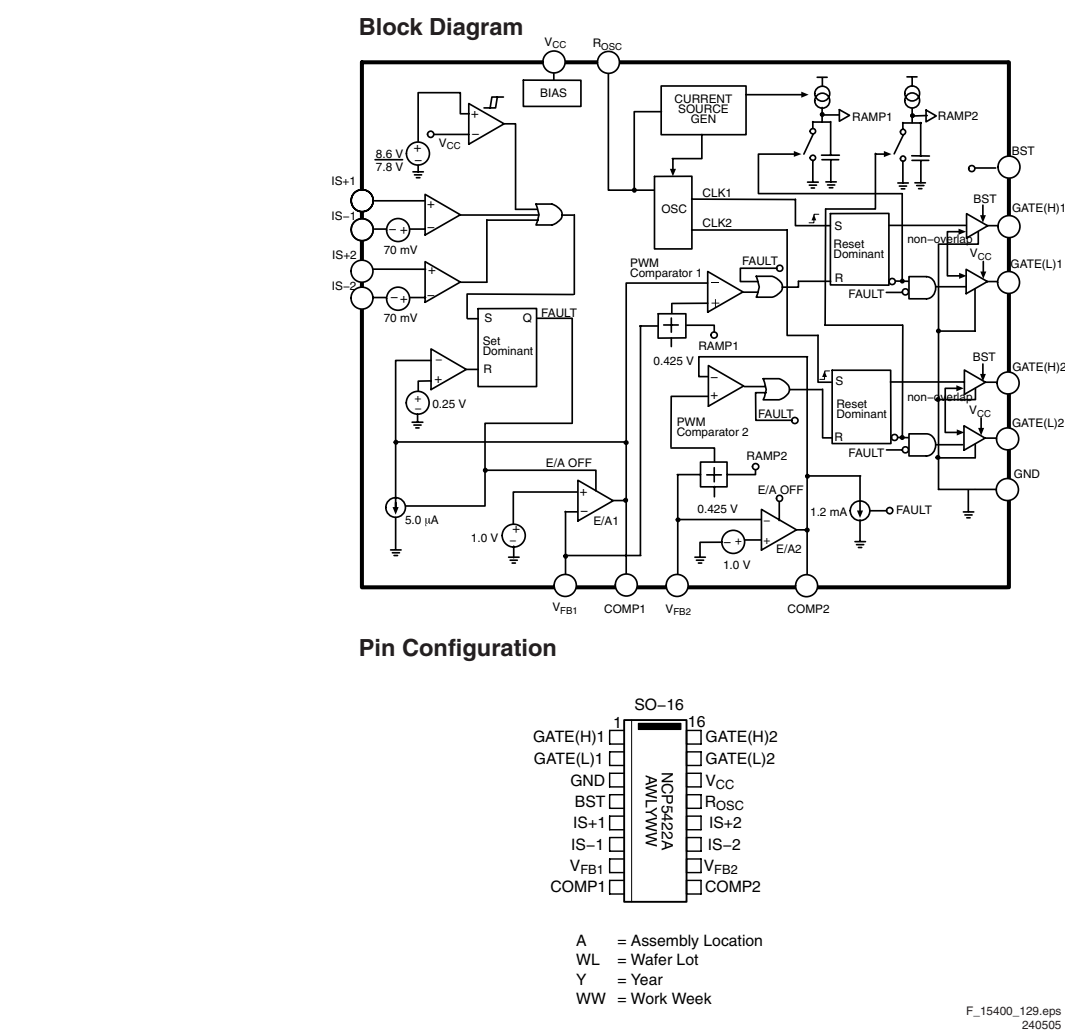
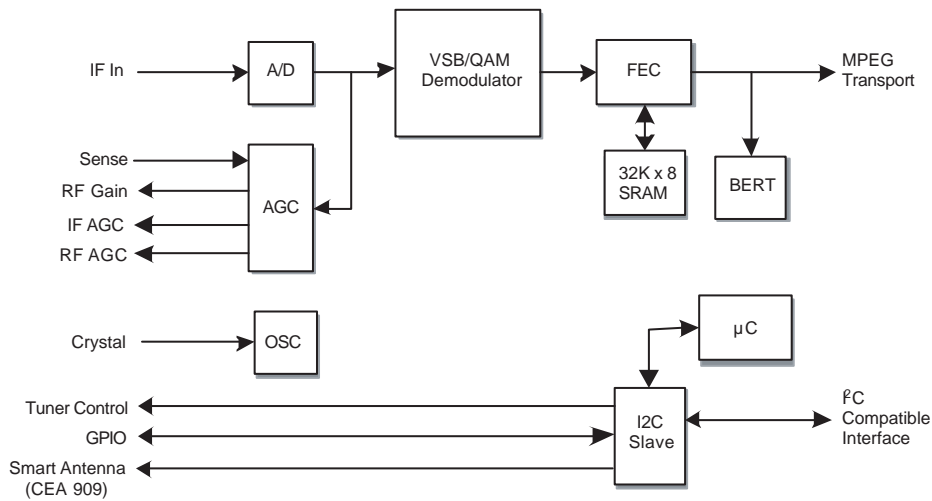


Figure 9-5 Internal block diagram and pin configuration

9.3.4 Diagram B2A, NXT2004 (IC 7T22)

Block Diagram



Pin Configuration

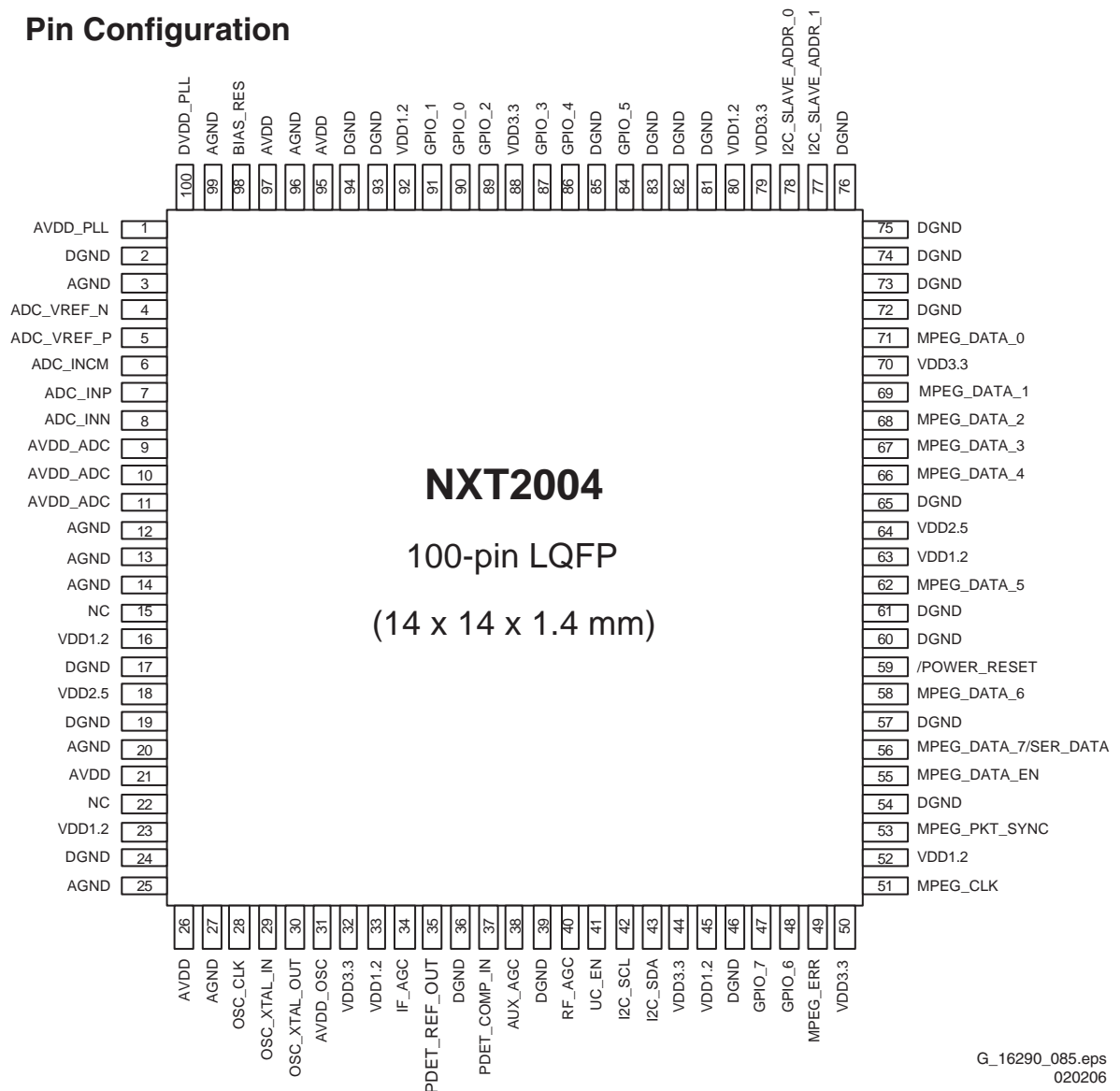
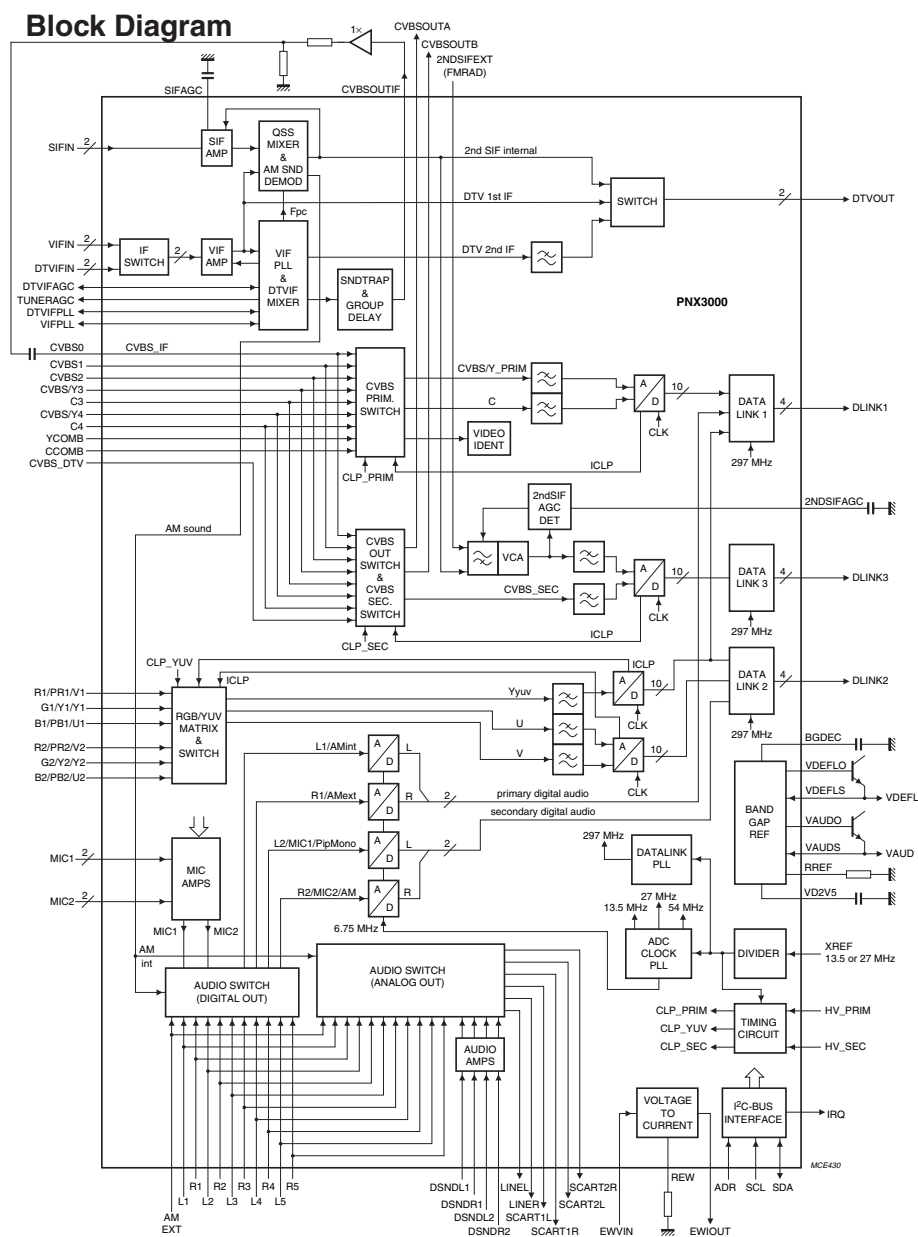


Figure 9-6 Internal block diagram and pin configuration

9.3.5 Diagram B3A/B/C/D, PNX 3000H (IC 7A00)



Pin Configuration

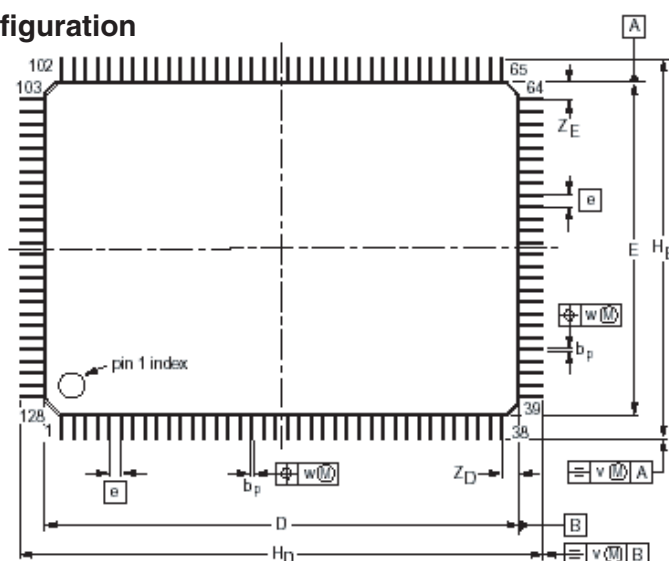
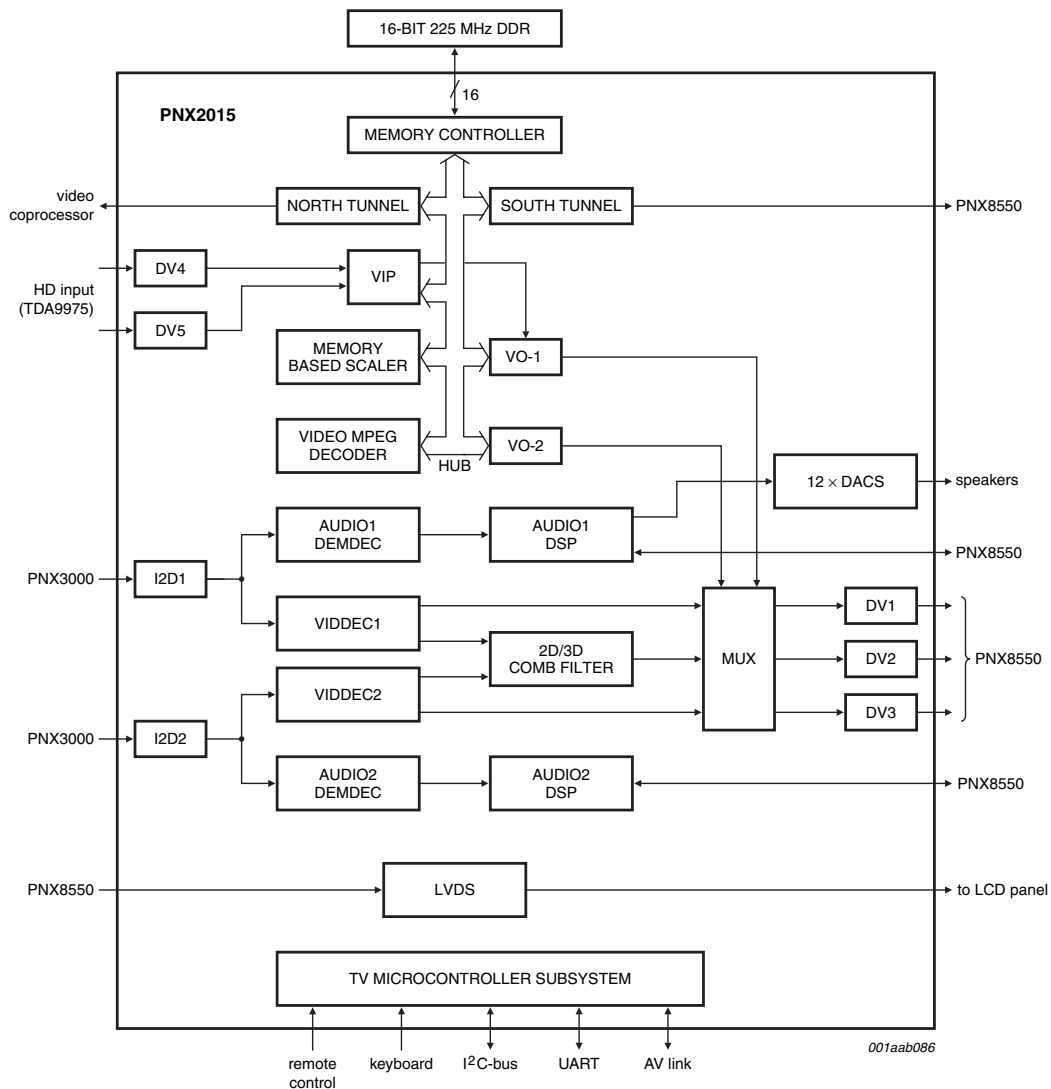


Figure 9-7 Internal block diagram and pin configuration

9.3.6 Diagram B4A/B/C/D/E/F, PNX 2015 (IC 7J00)

Block Diagram



Pin Configuration

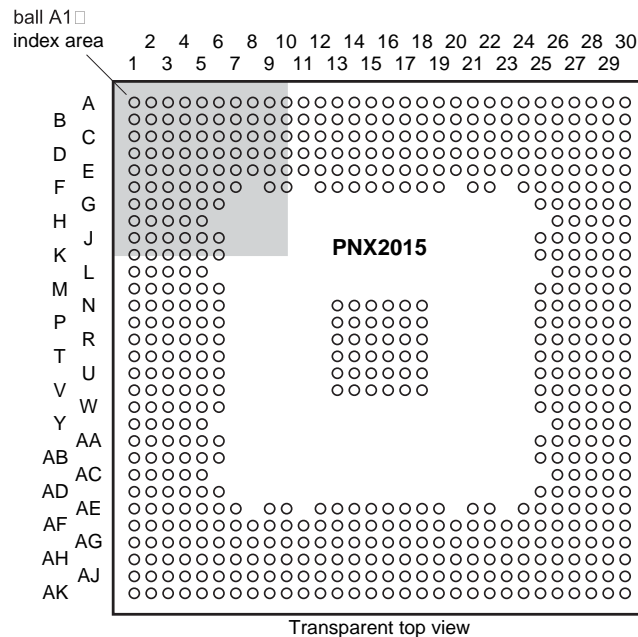
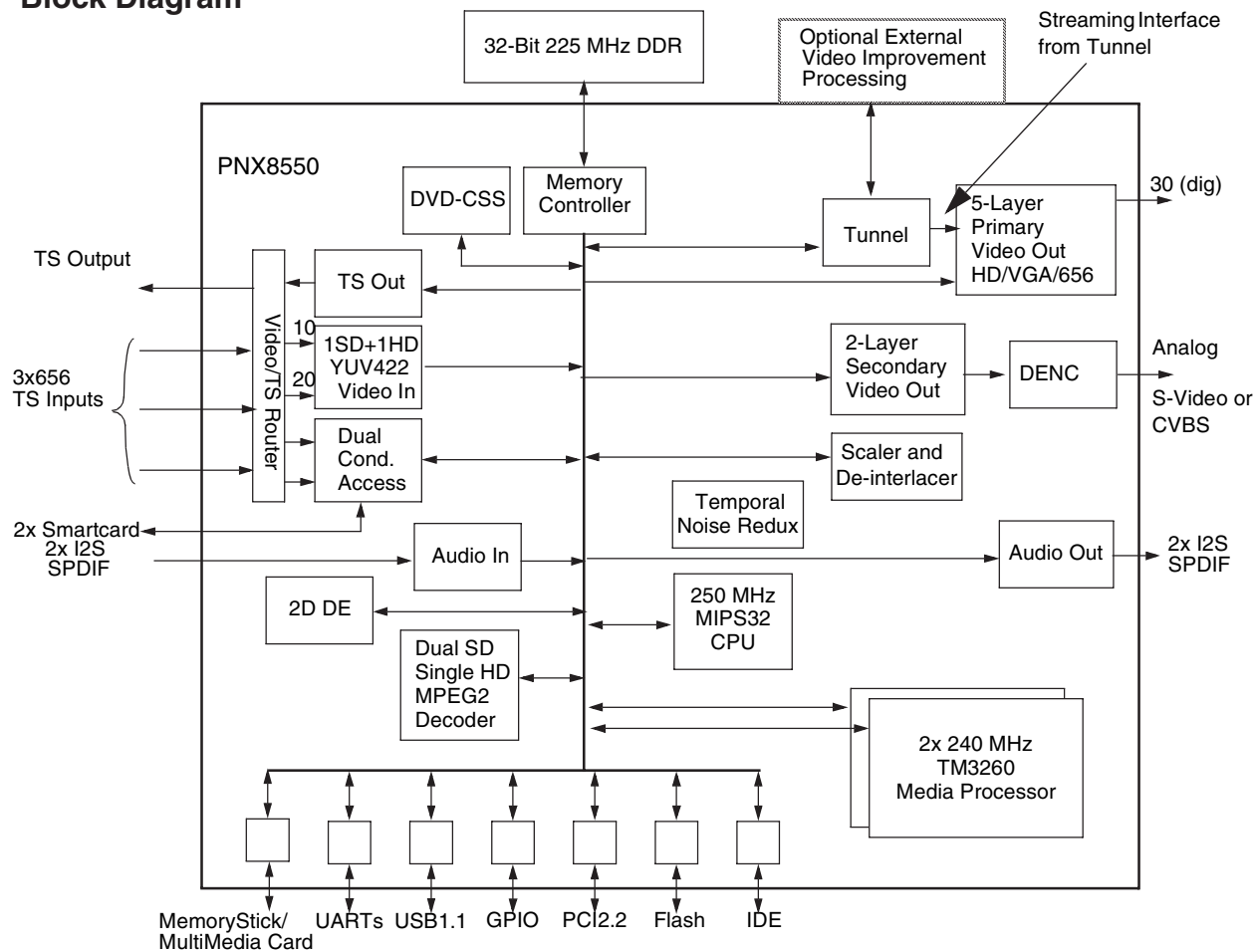
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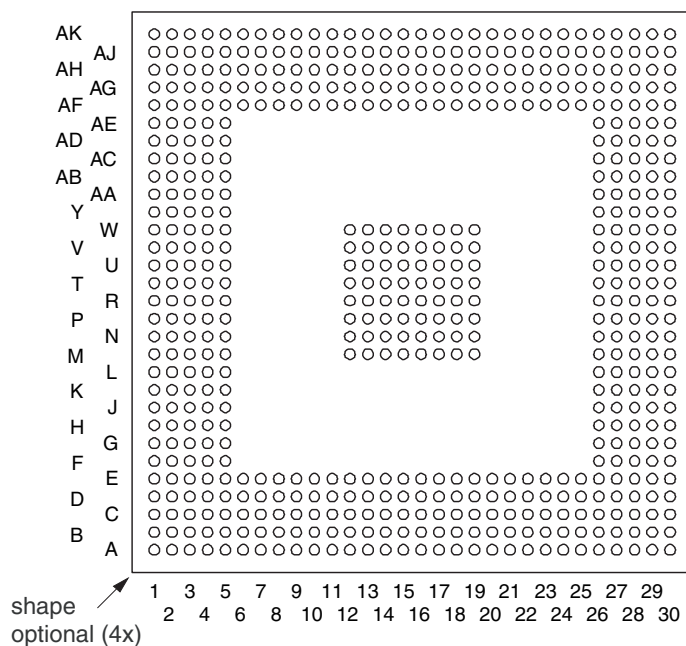
Figure 9-8 Internal block diagram and pin configuration

9.3.7 Diagram B5C, VIPER (IC 7V00)

Block Diagram



Pin Configuration

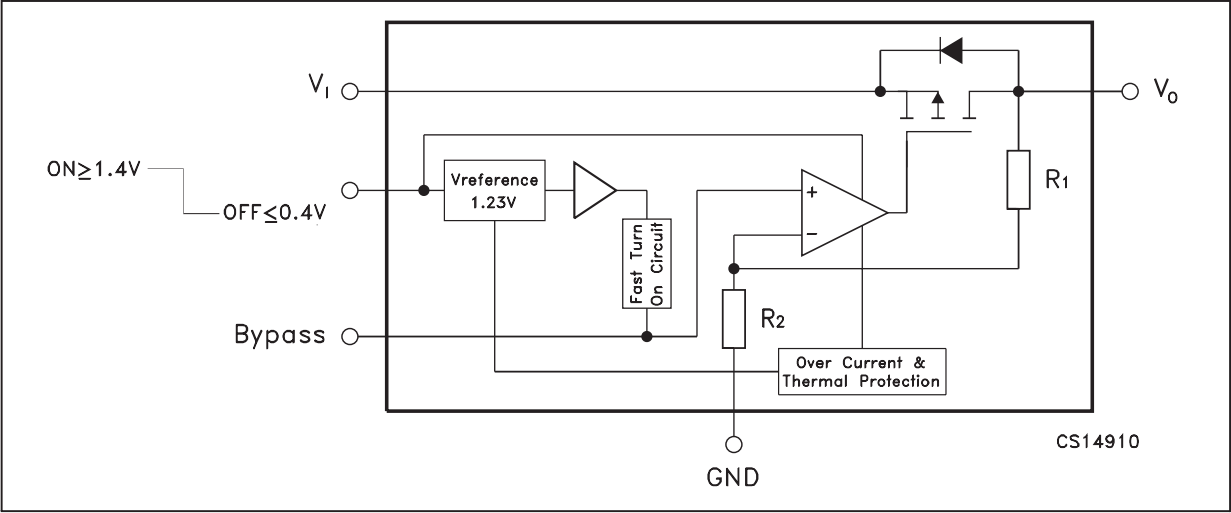


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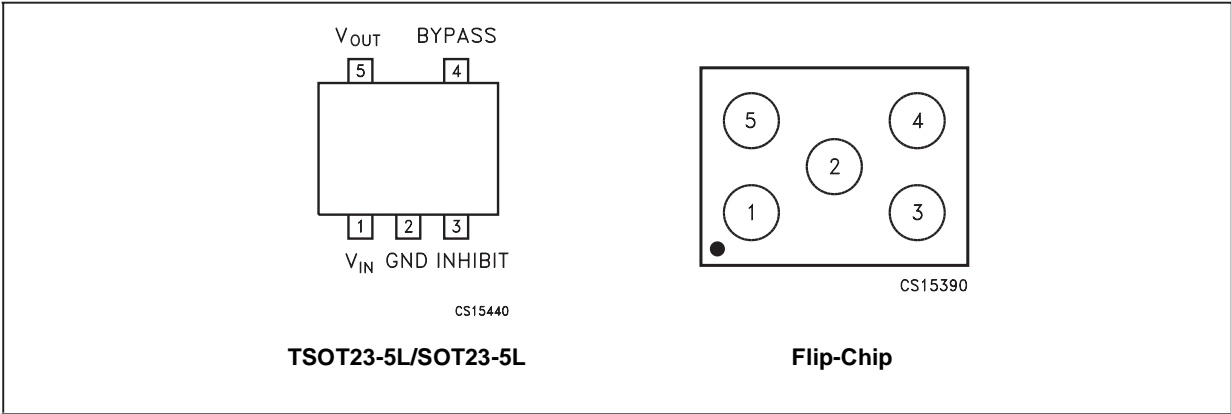
Figure 9-9 Internal block diagram and pin configuration

9.3.8 Diagram B5F, LD3985M33 (IC 7M05/6)
Diagram B6, LD3985M33 (IC 7G42)
Diagram B7A, LD3985M33 (IC 7B25)

Block Diagram



Pin Configuration

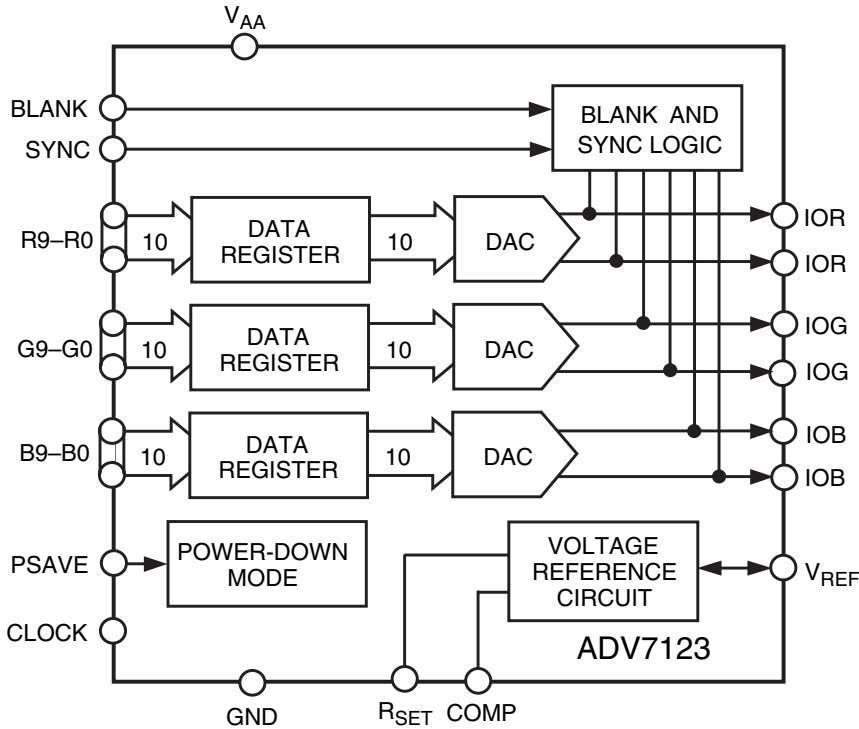


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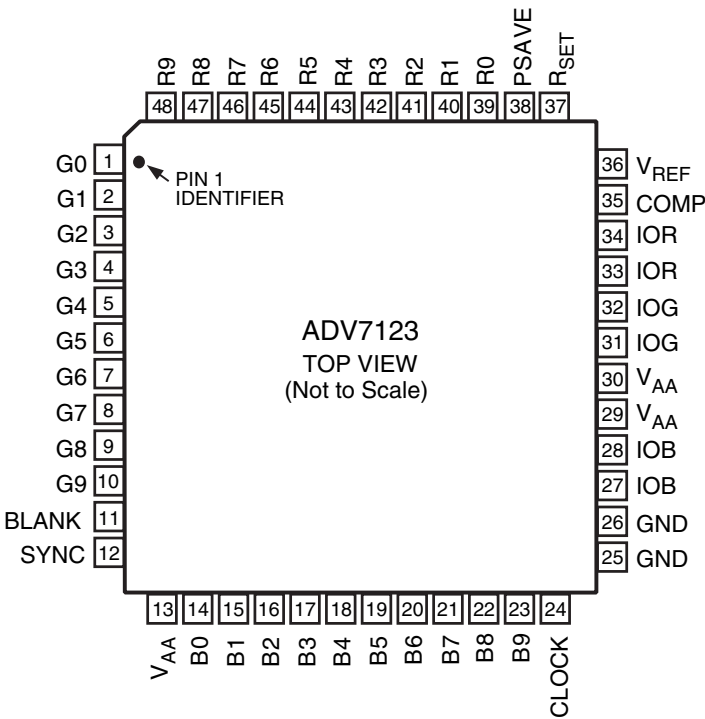
Figure 9-10 Internal block diagram and pin configuration

9.3.9 Diagram B6, ADV7123KSTZ140 (IC 7G40)

Block Diagram



Pin Configuration

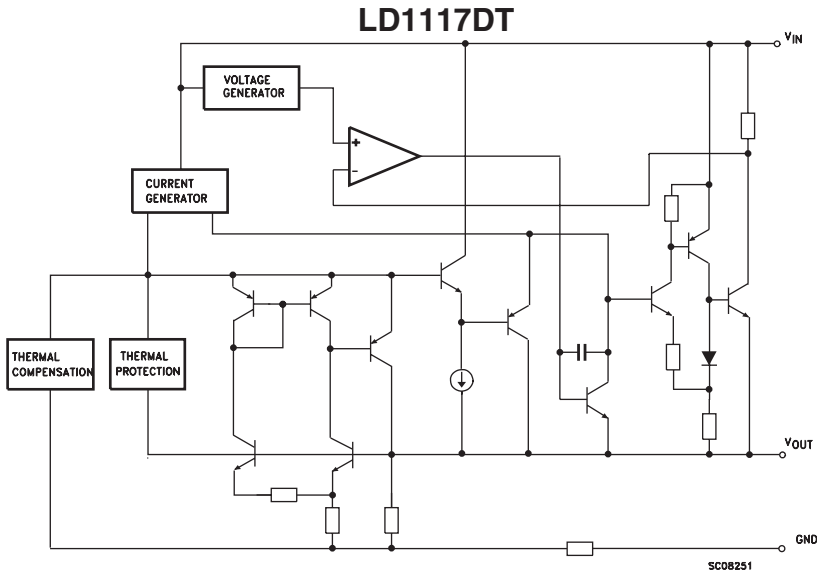


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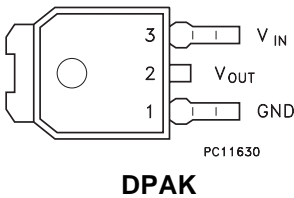
Figure 9-11 Internal block diagram and pin configuration

9.3.10 Diagram B7A, LD1117DT33 (IC 7B45)

Block Diagram



Pin Configuration

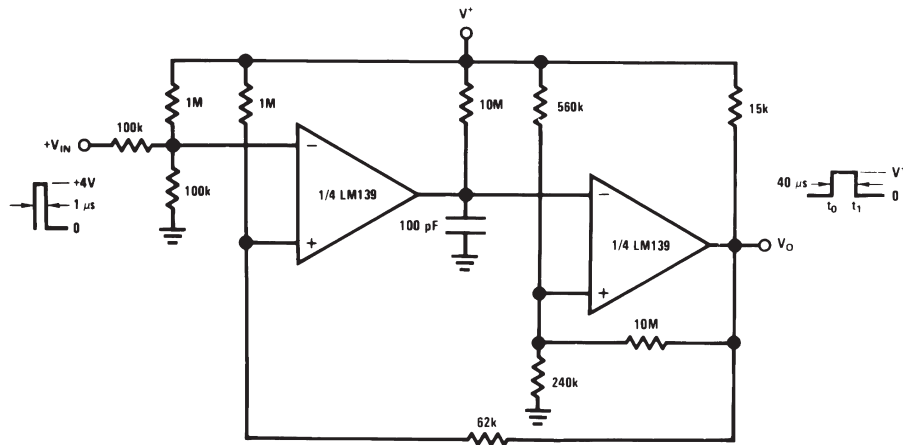


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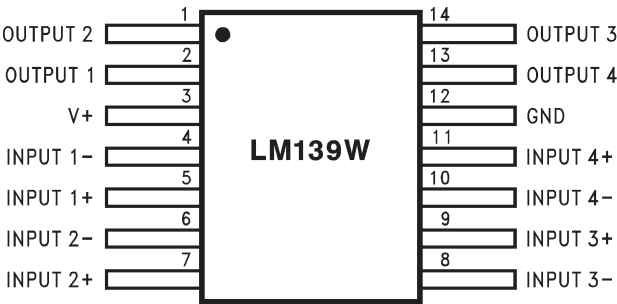
Figure 9-12 Internal block diagram and pin configuration

9.3.11 Diagram B8A, LM339P (IC 7D10)

Block Diagram



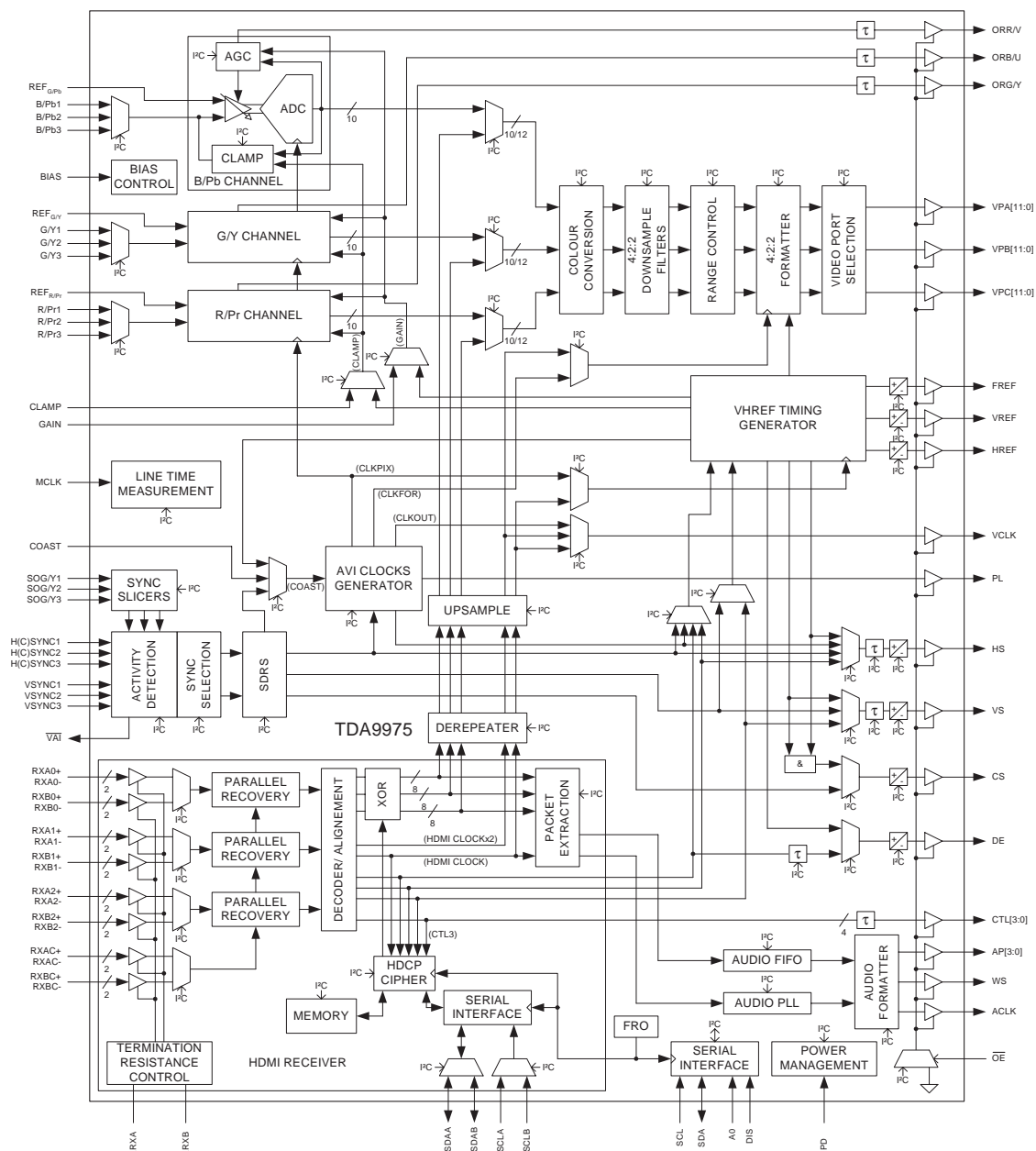
Pin Configuration



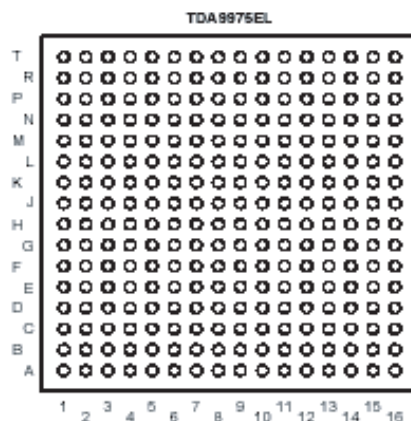
G_16290_082.eps
020206

Figure 9-13 Internal block diagram and pin configuration

Block Diagram



Pin Configuration



10. Spare Parts List

Not available at the time of writing. As soon as they become available, a Service Info or Service Manual update will be issued via the appropriate channels.

11. Revision List

Manual xxxx xxx xxxx.0

- First release.